CHAPTER 22

AUTO FLIGHT

LIST OF EFFECTIVE PAGES

N, R or D indicates pages which are New, Revised or Deleted respectively.

Remove and insert the affected pages and complete the Record of Revisions and the Record of Temporary Revisions as necessary.

CH/SE/SU	C	PAGE	DATE	CH/SE/SU	C	PAGE	DATE
L.E.P.	N	A	Mar 31/98				
L.E.P.	R	1	Mar 31/98				
L.E.P.	R	2	Mar 31/98				
L.E.P.	R	3	Mar 31/98				
L.E.P.	R	4	Mar 31/98				
L.E.P.	R	5	Mar 31/98				
L.E.P.	R	6	Mar 31/98				
L.E.P.	R	7	Mar 31/98				
L.E.P.	R	8	Mar 31/98				
L.E.P.	R	9	Mar 31/98				
L.E.P.	R	10	Mar 31/98				
L.E.P.	R	11	Mar 31/98				
L.E.P.	R	12	Mar 31/98				
L.E.P.	R	13	Mar 31/98				
L.E.P.	R	14	Mar 31/98				
L.E.P.	R	15	Mar 31/98				
L.E.P.	R	16	Mar 31/98				
L.E.P.	R	17	Mar 31/98				

CHAPTER 22

AUTO FLIGHT

LIST OF EFFECTIVE PAGES

N, R or D indicates pages which are New, Revised or Deleted respectively.

Remove and insert the affected pages and complete the Record of Revisions and the Record of Temporary Revisions as necessary.

CH/SE/SU	C	PAGE	DATE
RECORD OF TEMP. REVISION			
S.B.LIST		1	May 30/78
S.B.LIST		2	Nov 30/79
S.B.LIST		3	Nov 30/81
T. of C.		1	Sep 30/87
T. of C.		2	Nov 30/80
T. of C.		3	Nov 30/80
T. of C.		4	Nov 30/83
T. of C.		5	Nov 30/81
T. of C.		6	Nov 30/80
T. of C.		7	Nov 30/80
T. of C.		8	Nov 30/80
T. of C.		9	Aug 30/80
T. of C.		10	Nov 30/79
T. of C.		11	Feb 28/81
T. of C.		12	Nov 30/80
22-00-00		1	May 30/77
22-00-00		2	Aug 30/77
22-00-00		3	Aug 30/77
22-00-00		4	Aug 30/77
22-00-00		5	Aug 30/77
22-00-00		6	Aug 30/77
22-00-00		7	Aug 30/77
22-00-00		8	Aug 30/77
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22-00-00		12	Aug 30/77
22-00-00		13	Aug 30/77
22-00-00		14	Aug 30/77
22-00-00		15	Feb 28/81
22-00-00		16	Aug 30/77
22-00-00		17	Feb 28/81
22-00-00		18	Aug 30/77
22-00-00		19	Aug 30/77
22-00-00		20	Aug 30/77
22-00-00		21	Aug 30/77
22-00-00		22	Aug 30/77
22-00-00		23	Aug 30/77
22-00-00		24	Aug 30/77
22-00-00		25	Aug 30/77
22-00-00		26	Feb 28/81
22-00-00		27	Nov 30/80
22-00-00		28	Nov 30/80
22-00-00		29	Nov 30/80
22-00-00		30	Nov 30/80
22-00-00		31	Nov 30/80
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22-00-00		39	Nov 30/80
22-00-00		40	Feb 28/81
22-00-00		41	Feb 28/81
22-00-00		42	Nov 30/80
22-00-00		43	Nov 30/80
22-00-00		44	Nov 30/80
22-00-00		45	Nov 30/80
22-00-00		46	Nov 30/80
22-00-00		101	Feb 28/81
22-00-00		102	Nov 30/80
22-00-00		103	Nov 30/80
22-00-00		104	Nov 30/80
22-00-00		105	Nov 30/80
22-00-00		106	Nov 30/80
22-00-00		107	Nov 30/80
22-00-00		108	Nov 30/80
22-00-00		109	Nov 30/80
22-00-00		110	Nov 30/80

CH/SE/SU	C	PAGE	DATE	CH/SE/SU	C	PAGE	DATE
22-00-00		111	Nov 30/80	22-00-00		160	Nov 30/80
22-00-00		112	Nov 30/80	22-00-00		161	Nov 30/80
22-00-00		113	Nov 30/80	22-00-00		162	Nov 30/80
22-00-00		114	Nov 30/80	22-00-00		163	Nov 30/80
22-00-00		115	Nov 30/80	22-00-00		164	Nov 30/80
22-00-00		116	Nov 30/80	22-00-00		165	Nov 30/80
22-00-00		117	Nov 30/80	22-00-00		166	Nov 30/80
22-00-00		118	Nov 30/80	22-00-00		167	Nov 30/80
22-00-00		119	Nov 30/80	22-00-00		168	Nov 30/80
22-00-00		120	Nov 30/80	22-00-00		169	Nov 30/80
22-00-00		121	Nov 30/80	22-00-00		170	Nov 30/80
22-00-00		122	Nov 30/80	22-00-00		171	Nov 30/80
22-00-00		123	Nov 30/80	22-00-00		172	Nov 30/80
22-00-00		124	Nov 30/80	22-00-00		173	Nov 30/80
22-00-00		125	Nov 30/80	22-00-00		174	Nov 30/80
22-00-00		126	Nov 30/80	22-00-00		175	Nov 30/80
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22-00-00		131	Nov 30/80	22-00-00		180	Nov 30/80
22-00-00		132	Nov 30/80	22-00-00		201	Sep 30/87
22-00-00		133	Nov 30/80	22-00-00		202	Sep 30/87
22-00-00		134	Nov 30/80	22-00-00		203	Sep 30/87
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22-00-00		141	Nov 30/80	22-00-00		210	Sep 30/87
22-00-00		142	Nov 30/80	22-00-00		211	Sep 30/87
22-00-00		143	Nov 30/80	22-00-00		301	Jun 30/75
22-00-00		144	Nov 30/80				
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22-00-00		146	Nov 30/80	22-10-00		2	Nov 30/75
22-00-00		147	Nov 30/80	22-10-00		3	Aug 30/77
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22-00-00		157	Nov 30/80	22-10-00		13	Aug 30/77
22-00-00		158	Nov 30/80	22-10-00		14	Aug 30/77
22-00-00		159	Nov 30/80	22-10-00		15	May 30/80

CH/SE/SU	C	PAGE	DATE	CH/SE/SU	C	PAGE	DATE
22-10-00		153	Nov 30/79	22-10-00		A102	May 30/76
22-10-00		154	May 30/76	22-10-00		A103	May 30/76
22-10-00		155	May 30/76	22-10-00		A104	May 30/76
22-10-00		156	May 30/76	22-10-00		A105	May 30/76
22-10-00		157	May 30/76	22-10-00		A106	May 30/76
22-10-00		158	May 30/76	22-10-00		A107	May 30/76
22-10-00		159	May 30/76	22-10-00		A108	May 30/76
22-10-00		160	May 30/76	22-10-00		A109	May 30/76
22-10-00		161	May 30/76	22-10-00		A110	May 30/76
22-10-00		162	May 30/76	22-10-00		A111	May 30/76
22-10-00		163	May 30/76	22-10-00		A112	May 30/76
22-10-00		164	May 30/76	22-10-00		A113	May 30/76
22-10-00		165	May 30/76	22-10-00		A114	May 30/76
22-10-00		166	May 30/76	22-10-00		A115	May 30/76
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22-10-00		171	May 30/76	22-10-00		A120	May 30/76
22-10-00		172	May 30/76	22-10-00		A121	Aug 30/80
22-10-00		173	May 30/76	22-10-00		A122	May 30/76
22-10-00		174	May 30/76	22-10-00		A123	May 30/76
22-10-00		175	May 30/76	22-10-00		A124	May 30/76
22-10-00		176	May 30/76	22-10-00		A125	May 30/76
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22-10-00		190	May 30/76	22-10-00		314	Nov 30/80
22-10-00		191	May 30/76	22-10-00		501	Sep 30/87
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22-10-00		197	May 30/76	22-10-00		507	Aug 30/77
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22-10-00		199	May 30/76	22-10-00		509	Aug 30/77
22-10-00		A100	May 30/76	22-10-00		510	Aug 30/77
22-10-00		A101	May 30/76	22-10-00		511	Aug 30/77

PRINTED IN ENGLAND

CH/SE/SU	C	PAGE	DATE	CH/SE/SU	C	PAGE	DATE
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22-10-00		513	Aug 30/77	22-10-00		562	Feb 28/79
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22-10-00		525	Feb 28/79	22-10-00		574	Feb 28/79
22-10-00		526	Feb 28/79	22-10-00		575	Feb 28/79
22-10-00		527	Feb 28/79	22-10-00		576	Feb 28/79
22-10-00		528	Feb 28/79	22-10-00		577	Feb 28/79
22-10-00		529	Feb 28/79	22-10-00		578	Feb 28/79
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22-10-00		560	Feb 28/79	22-11-00		25	Aug 30/77

CH/SE/SU	C	PAGE	DATE
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22-11-00		27	Aug 30/77
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22-12-00		43	Aug 30/77
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22-12-00		45	Aug 30/77
22-12-00		46	Aug 30/77

CH/SE/SU	C	PAGE	DATE	CH/SE/SU	C	PAGE	DATE
22-12-00		47	Aug 30/77	22-12-61		401	May 30/77
22-12-00		48	Aug 30/77	22-12-61		402	May 30/77
22-12-00		49	Aug 30/77	22-12-61		403	May 30/77
22-12-00		50	Aug 30/77	22-12-61		404	May 30/77
22-12-00		51	Aug 30/77	22-12-61		501	Feb 28/81
22-12-00		52	Aug 30/77	22-12-61	R	502	Mar 31/98
22-12-00		53	Aug 30/77	22-12-61		503	Nov 30/80
22-12-00		54	Aug 30/77	22-12-61		504	Feb 28/81
22-12-00		55	Aug 30/77	22-12-61		505	Feb 28/81
22-12-00		56	Aug 30/77	22-12-61	R	506	Mar 31/98
22-12-00		57	Aug 30/77	22-12-61		507	Nov 30/80
22-12-00		58	Aug 30/77	22-12-61		508	Nov 30/80
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22-12-00		60	Aug 30/77	22-12-61		510	Nov 30/80
22-12-00		61	Aug 30/77				
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22-40-00		3	Jun 30/75
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22-41-00		2	Jun 30/75

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22-41-81		403	Feb 29/80

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22-42-81		403	Feb 29/76				

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SERVICE BULLETIN LIST

In the following service bulletin list, SB indicates an aircraft manufacturers bulletin, AEB indicates an airline engineering bulletin and OL indicates an engine manufacturers bulletin (complete identification OL.593-XX-XXX).

SB/AEB NO	REV	INC. IN REVISION	DESCRIPTION
SB 22-001			No effect Auto flight -Modification to the ITEM control and display unit
SB 22-001	01		No effect Auto flight -Modification to the ITEM control and display unit
SB 22-001	02		No effect Auto flight -Modification to the ITEM control and display unit
SB 22-001	03		No effect Auto flight -Modification to the ITEM control and display unit
SB 22-002		Feb 28/77	Embodied Auto flight -Authorisation for automatic landing with both autopilots engaged
SB 22-002	01		Not applicable
SB 22-002	02		Not applicable
SB 22-003			No effect Auto flight -Improvement to the warning and landing display power supply monitoring function of the ITEM.
SB 22-003	01		Embodied Auto flight -Improvement to the warning and landing display power supply monitoring function of the ITEM.
SB 22-004			Not applicable
SB 22-005		May 30/77	Embodied Autopilot. Improved aircraft automatic control mode in cruise.
SB 22-005	01		No effect Autopilot. Improved aircraft automatic control mode in cruise.
SB 22-005	02		No effect Autopilot. Improved aircraft automatic control mode in cruise.
SB 22-005	03	May 30/77	Embodied Autopilot. Improved aircraft automatic control mode in cruise.
SB 22-005	04		No effect

SERVICE BULLETIN LIST

SB/AEB NO	REV	INC. IN REVISION	DESCRIPTION
			Autopilot. Improved aircraft automatic control mode in cruise.
SB 22-006		May 30/77	Embodied
			Autopilot. Modification to longitudinal flight director
SB 22-006	01		No effect
			Autopilot. Modification to longitudinal flight director
SB 22-007			Applicable
			Autopilot -Improved autothrottle monitoring by the I.T.E.M. (I.F.M. function)
SB 22-007	01		Applicable
			Autopilot -Improved autothrottle monitoring by the I.T.E.M. (I.F.M. function)
SB 22-008			No effect
			Autopilot.Improvement to the altitude alert system
SB 22-008	01		No effect
			Autopilot.Improvement to the altitude alert system
SB 22-009		May 30/77	Embodied
			Autopilot. Modification to AP/FD and WLD computers to allow for category 3A automatic landing
SB 22-009	01		No effect
			Autopilot. Modification to AP/FD and WLD computers to allow for category 3A automatic landing
SB 22-010			No effect
			Autopilot. Improvement to the A.F.C.S. warning and landing display system
SB 22-010	01		No effect
			Autopilot. Improvement to the A.F.C.S. warning and landing display system
SB 22-011			No effect
			Autopilot. Modification to the lateral flight director
SB 22-011	01		Embodied
			Autopilot. Modification to the lateral flight director
SB 22-012			No effect
			Auto flight -Operational check of AFCS and SFC computers by using ITEM
SB 22-012	01		Applicable

SB/AEB NO	REV	INC. IN REVISION	DESCRIPTION
			Auto flight -Operational check of AFCS and SFC computers by using ITEM
SB 22-012	02		Applicable Auto flight -Operational check of AFCS and SFC computers by using ITEM
SB 22-013			No effect Auto flight -Operational check of radio-altimeter failure warning signal to warning and landing display
R SB 22-013	01		No effect Auto flight -Operational check of radio-altimeter failure warning signal to warning and landing display
SB 22-014			Not applicable
SB 22-015			Applicable Auto-flight -To add interference filters to AP inputs of warning and landing display computers
SB 22-016			Applicable Auto flight -Warning and landing display indicators -Replace AT and AP push-button warning lights by fixed warning lights
SB 22-016	01		Applicable Auto flight -Warning and landing display indicators -Replace AT and AP push-button warning lights by fixed warning lights
SB 22-016	02		Applicable Auto flight -Warning and landing display indicators -Replace AT and AP push-button warning lights by fixed warning lights
SB 22-017			Not applicable
SB 22-018			Not applicable
SB 22A019			Applicable Auto Flight - Improved monitoring of Trim Computer Power Supply Voltages
SB 31-011		Nov 30/78	Embodied Instruments -Accessibility -To improve replacement times for various instruments, LH and RH pilot's panels
SB 32-001		Feb 29/76	Embodied Landing gear -Modification to ground safety system for the nose landing gear telescopic strut.

CHAPTER 22

AUTO FLIGHT

TABLE OF CONTENTS

1. General

Concorde's Automatic Flight Control System (AFCS) is intended to ensure full control of the aircraft throughout the flight envelope from the beginning of climb until touch-down.

The AFCS comprises :

A. Data sources providing the various parameters required for flight control.

B. Data processing systems and control monitoring systems.

C. Captain's and First Officer's indicators.

2. Data sources

Various data sources provide the AFCS with the main data used as reference for aircraft automatic control. These data are supplied by systems, sensors and indicators, which are :

A. Three Inertial Navigation Systems (INS) and the ISCU.

B. Two Air Data Systems (ADS).

C. Two VOR radio receivers.

D. Two ILS radio receivers.

E. Two radio altimeters.

F. Two Compass Couplers

G. Eight rate-gyros (four for pitch axis and two on each of the two remaining axes (roll and yaw).

H. Two lateral accelerometers.

I. Two longitudinal accelerometers.

J. Three relay jack sensors (RJS).

K. Two track and heading preselection units (THU)

L. Two course deviation indicators (CDI) (course setting) integrated in the AFCS control unit.

M. Two horizontal situation indicators (HSI).

N. Two vertical speed indicators (VSI).

3. Systems
(Ref. Fig. 001)

The AFCS comprises the following systems :

A. Autopilot and flight director (AP/FD) system.

B. Autostabilization System (AS).

C. Electric Trim system (on pitch axis only) (ET).

D. Autothrottle system (AT).

E. Warning and Landing Display system (W and LD).

F. Integrated Test and Maintenance system (ITEM)

All these systems are fully duplicated and self monitored. They provide for automatic change-over and for aural/visual warnings in case of failure.

Priority is given to lane 1 ; switching from failed lane 1 to lane 2 is automatic, except for the autopilot (AP) during cruise flight.

All computers are mounted in electronics racks at the rear of the flight compartment, LH side for lane 1, RH side for lane 2. For test and maintenance purposes, these computers are provided with two connectors, ZA (control) and ZB (monitoring), located on the front face. Only the ITEM computers are provided with a single connector.

Computer energization starts up an elapsed time indicator. A pointer on the indicator vibrates when power is supplied. On the rear face of the computer, four sockets serve for connection to the aircraft electrical network.

4. Indicators

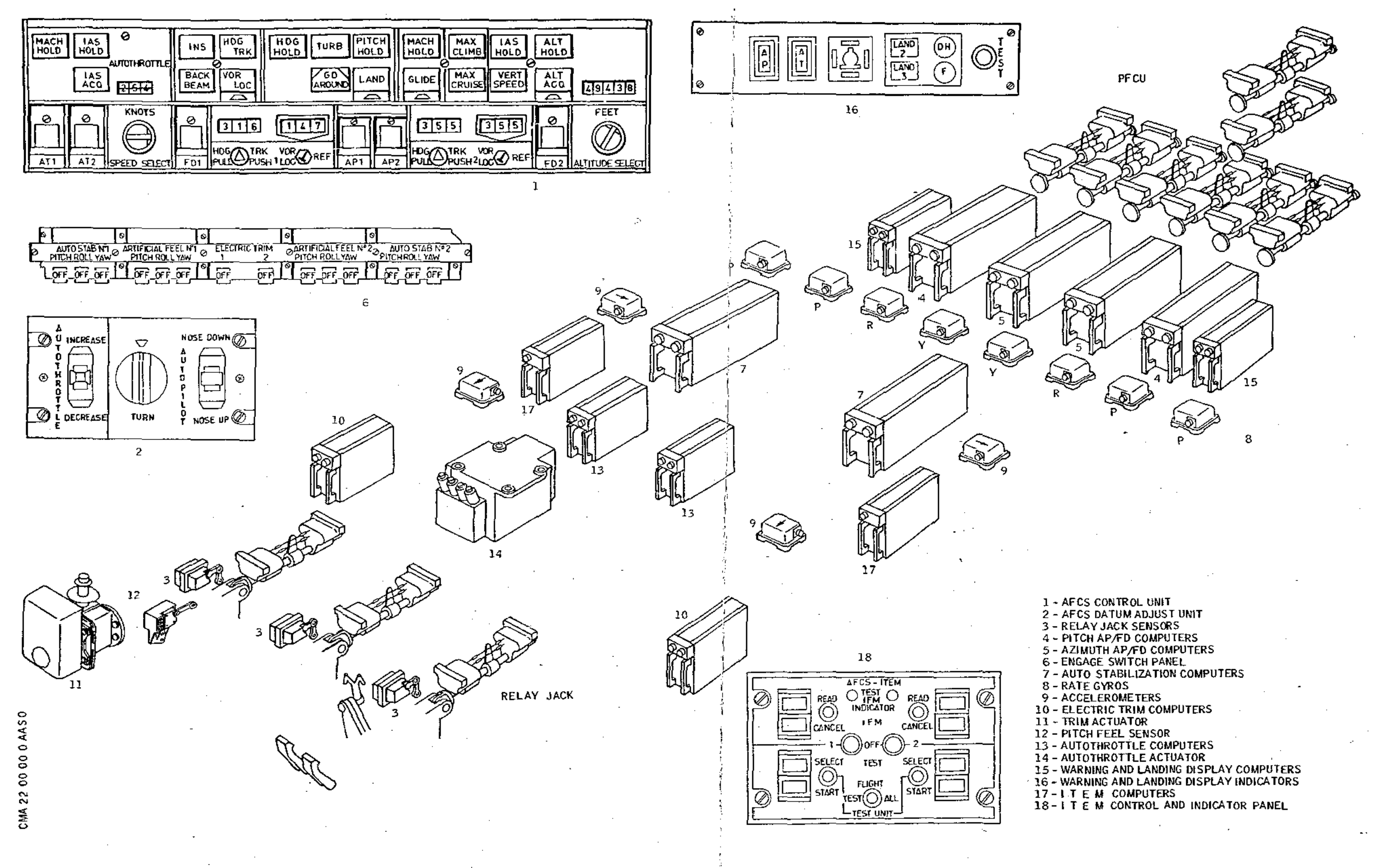
The AFCS indicators consist of :

A. Two Attitude Director Indicators (ADI)

B. Two Horizontal Situation Indicators (HSI)

C. Two Vertical Speed Indicators (VSI)

D. Two Warning and Landing Display Indicators.



AFCS Main Components
Figure 001

E. The ITEM Control and Indicator Panel.

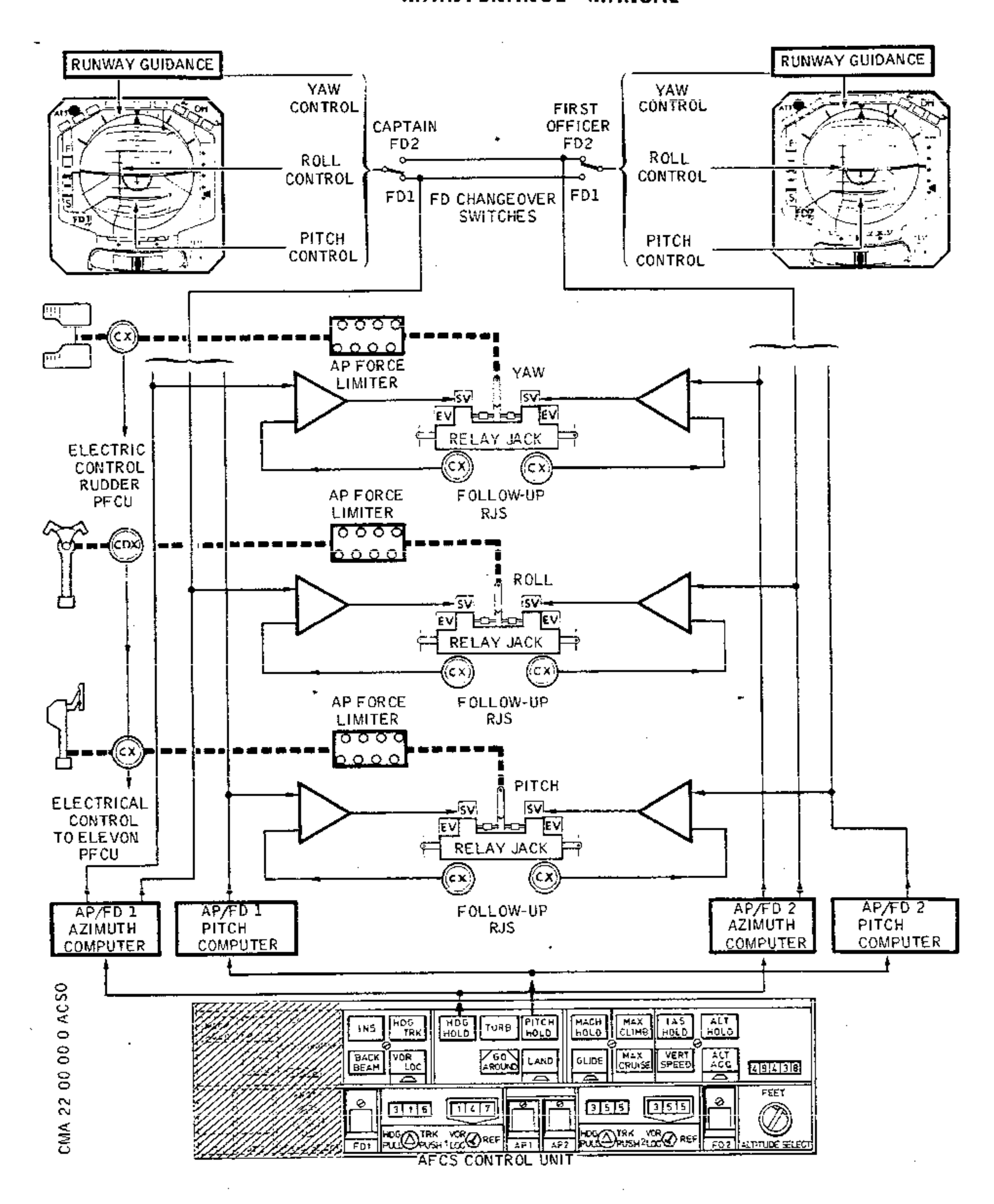
NOTE : This panel is located at the Flight Engineer's station, whereas the other indicators are located on Captain's and First Officer's instrument panels.

5. <u>Autopilot and Flight Director System</u>
(Ref. Fig. 002)

The autopilot and the flight director are integrated in the same computers.
They can be engaged concurrently, autopilot orders are then transmitted to the relay jack sensors (RJS) whereas the flight director orders are transmitted to the attitude director indicator (ADI) FD control bars.
This system was designed with the usual automatic control modes. These modes provide for aircraft control throughout the flight envelope, from the beginning of climb until touch-down. All the computation channels are self-monitored and all the circuits are voltage-limited so that control signals cannot result in a load factor which is greater than 0.15 g.

When the autopilot is engaged from the AFCS control unit, the mechanical linkage to the control components is locked on the relay jack sensor (RJS) body. The mechanical linkage from the RJS to the power flight control units (PFCU) is then disconnected at PFCU level. The autopilot signals are transmitted through electrical control.

Between each RJS and the artificial feel system is mounted a spring rod with a threshold enabling an autopilot force limitation to be obtained. This rod is compressed for a large AP command, acting on microswitches which cause the engaged AP to disengage.



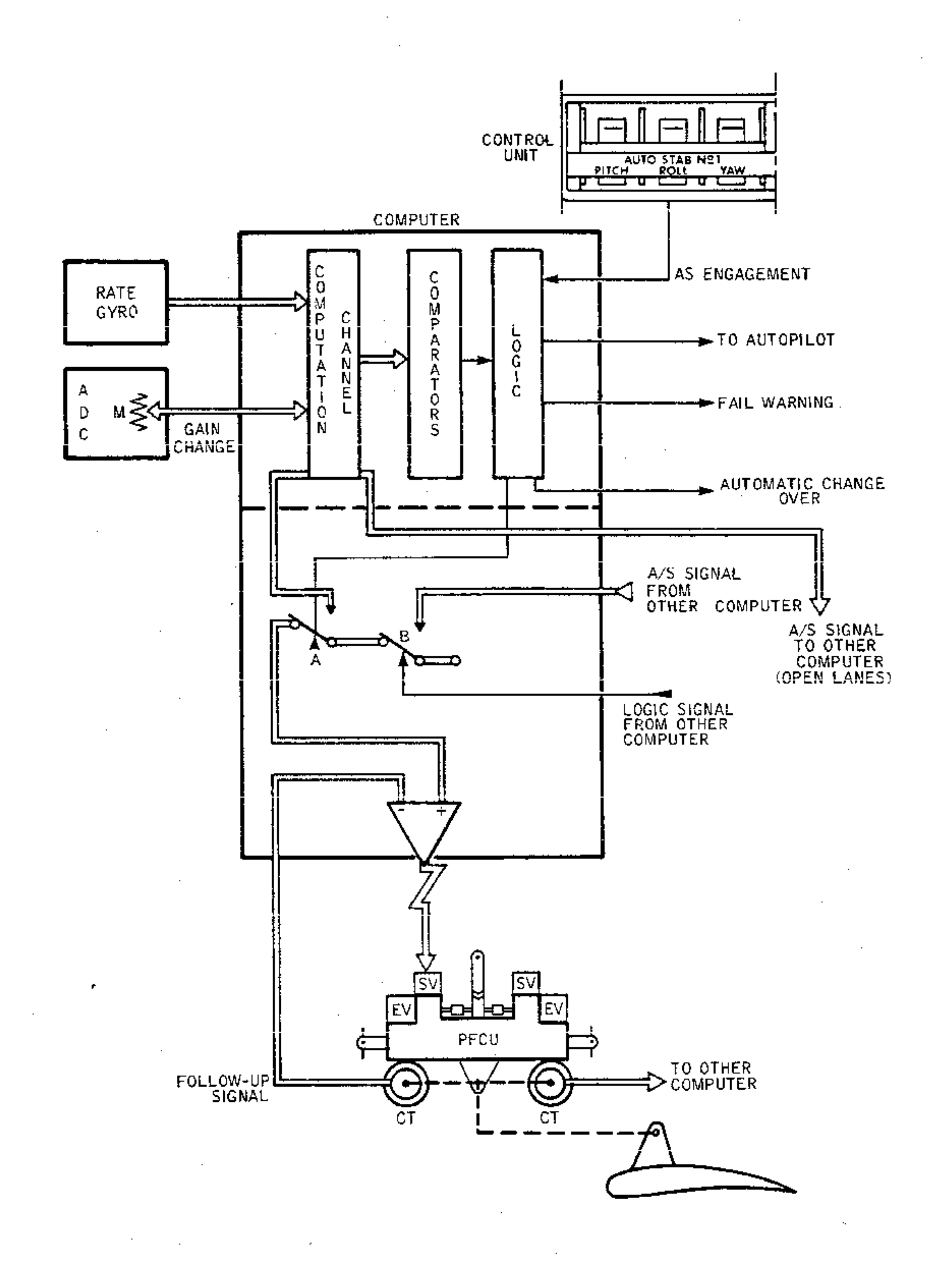
AP and FD Control Signal Distribution Schematic
Figure 002

6. Autostabilization System (Ref. Fig. 003)

The Autostabilization system provides damping of the aircraft response about the three axes following various interferences. It results in improvement of flight conditions throughout the flight envelope.

The principle is as follows : a rate gyro, which starts a servo-loop (the aircraft being the feedback), senses rotation of the aircraft about the axis considered. This signal is processed in a computation channel as a function of on the Mach number from the air data computer (ADC) potentiometers. The output signal is then transmitted to the PFCU servo-valves through change-over relays called open lanes and flight control amplifiers. In addition to this basic function, which is to stabilize the aircraft, the artificial stabilization also enables :

- yawing caused by engage failure or a high angle-of-attack manoeuvre to be reduced (automatic yaw damping functions).
- automatic turn coordination (roll-yaw) to be provided throughout the flight envelope. The autostabilization system becomes active only when the flight controls are in the Blue or Green electrical mode.
  Moreover, the autostabilization system is linked to the Safety Flight Control system for superstabilization functions (pitch axis) when the indicated airspeed (IAS) is lower than 270 knots, as well as to the emergency control (pitch and roll axes), and to the autopilot system.



Autostabilization Operation Principle
Figure 003

7. Electric Trim System (Ref. Fig. 004)

The electric trim system is installed on the pitch axis only.

Each lane of the trim actuator is supplied with a control voltage from the associated trim computer. Through an electromagnetic clutch energized by the computer of the active lane, the actuator causes the servo motor output shaft to rotate, which ensures the displacement of the artificial feel, in order to cancel the effort applied to the control column, the other lane being synchronized with the active lane.

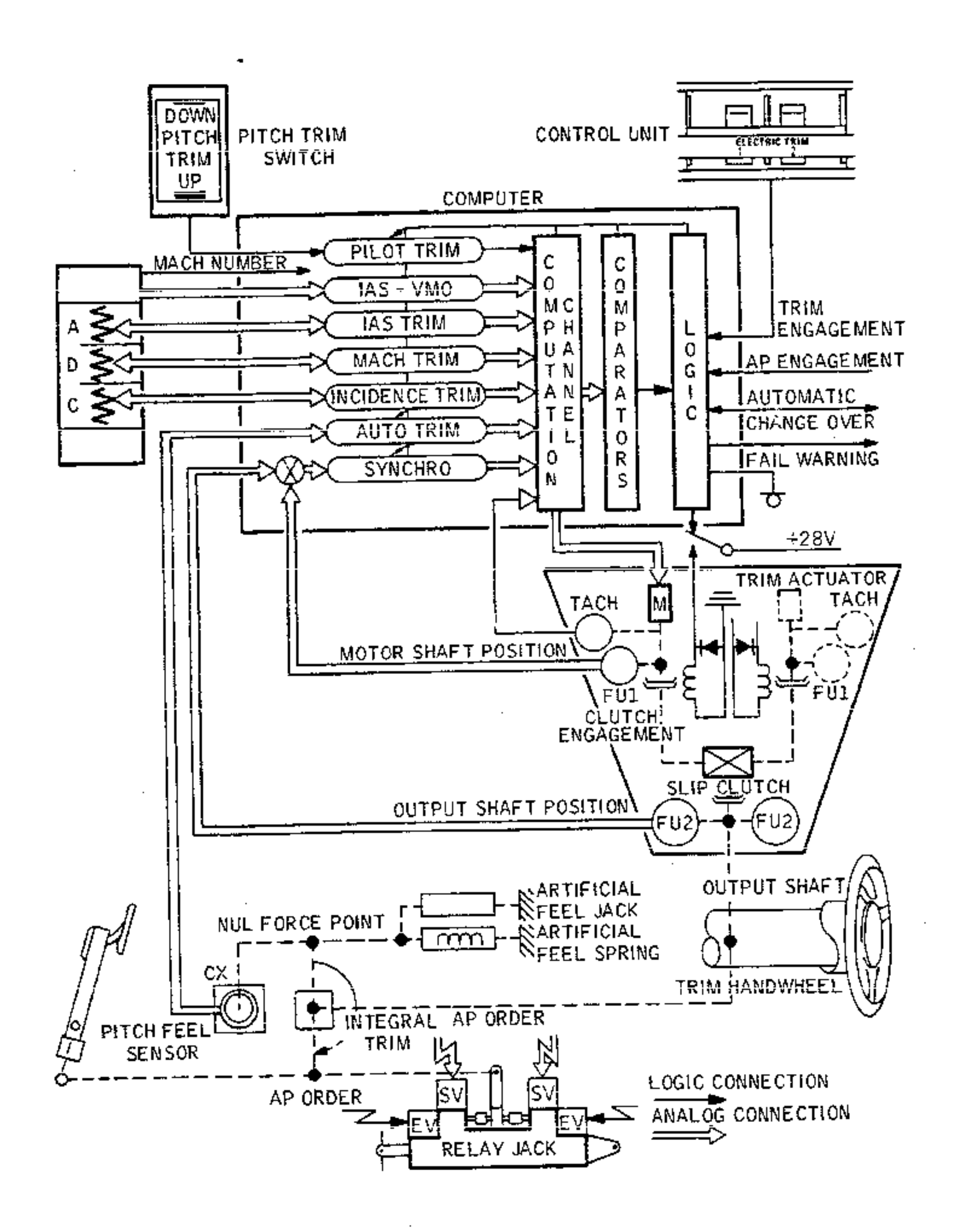
The control signals are generated in the computer according to three operation modes.

In pilot trim condition, trim operation is ensured through actuation of either the Captain's or the First Officer's PITCH TRIM control switch on the control column handwheels. As long as the pilot operates the switch in the UP or DOWN direction, the servo motor output shaft rotates at constant speed in the corresponding direction.

When the autopilot is engaged (autotrim), the actuator control signal is calculated from the pitch feel sensor so that, in case of AP disconnection the load factor resulting from control column wheel return to nul effort position is lower than a given value.

In the two above mentioned control methods, trim operation is slaved to a compensation trim which improves the aircraft stabilization according to the Mach number, the angle-of-attack, the indicated air speed (IAS) and the difference between this speed and the maximum operational speed (VMO). These stabilization functions are provided by the potentiometers located in the associated ADC.

The non-active base is synchronized so that the active lane command signal is continuously recopied, and so that it can take over in the case of disconnection of the active lane. This operation mode exists as soon as the aircraft electrical network is energized, even when neither lane is engaged.



Electric Trim Operation Principle
Figure 004

8. Autothrottle System
(Ref. Fig. 005)

A. The autothrottle system is used as an aid to piloting in the flight phases requiring accurate control of speed. It is incompatible with an AP pitch channel speed holding mode, though the autothrottle system is physically independent from the AP system.

B. It provides the following functions.

(1) IAS HOLD (system basic mode) : speed hold with adjustment facility.

(2) MACH HOLD, with adjustment facility

(3) IAS ACQ, acquisition of pre-selected speed

(4) Automatic throttle reduction on automatic landing below an altitude of 15 feet in IAS ACQ mode.

(5) Speed hold during altitude capture, with autopilot control.

(6) Automatic throttle reduction if the Reference Cruising Speed (VRC) is significantly exceeded with the AP/FD in MAX CRUISE mode.

C. Each actuator lane receives a control voltage from the associated autothrottle computer. Through isolation and electromagnetic clutches activated by the computer of the engaged lane and through isolation switches, the motor moves the throttle control levers and, through the throttle control lever mechanical linkages, the engine electrical control synchros, the other lane being synchronized with the active lane.

D. These control signals are generated from :

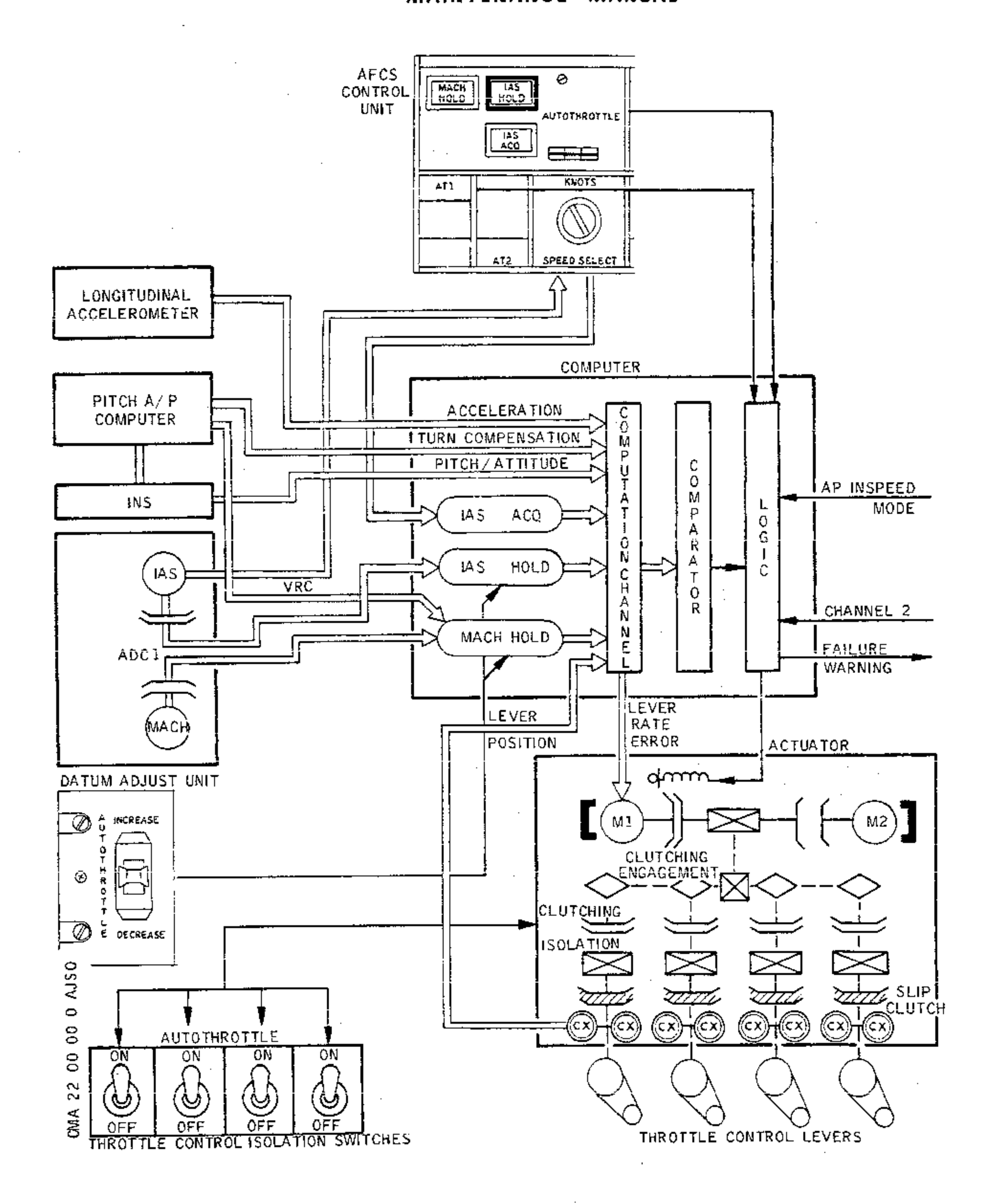
(1) Speed or Mach error signals provided by synchros, which can be clutched on engagement, in the associated ADC.

(2) Pitch attitude signals

(3) Longitudinal acceleration and attitude compensation term signals.

(4) Reference cruising speed (VRC) signals.

E. The non-active lane is synchronized so that the active



Autothrottle Operation Principle
Figure 005

lane command signal is continuously recopied, and so that it can take over in case of disconnection of the active lane. This mode exists as soon as the aircraft electrical network is energized in order to avoid thrust variation on engagement.

9. Warning and Landing Display System
(Ref. Fig. 006)

A. The warning and landing display (W & LD) system provides the pilot with information about the operation condition and capabilities of the AFCS in automatic approach and landing.

B. It generates AP/FD and AT disconnection orders.
It also indicates faults in the AP and AT throughout the flight envelope.
It is used to cancel the FD control bars on the ADI in the case of a fault in the ILS receivers.

C. It comprises two identical lanes : lane 1 at the Captain's side and lane 2 at the First Officer's side.
Both lanes are supplied as soon as the aircraft electrical network is energized.
The two lanes are operational at the same time. Each computer is associated with the indicator located at the same side of the aircraft.

D. In the case of total loss of the autopilot, a red AP warning light illuminates on both indicators and an aural warning (cavalry charge) sounds. In the case of total loss of the autothrottle system, a red AT warning light flashes. These warnings can be cancelled by pressing the corresponding warning light, or by pressing the AP disconnect or AT instinctive disconnect pushbuttons. The AP disconnect pushbuttons are located on the Captain's and First Officer's control column handwheels, and the AT instinctive disconnect pushbuttons are located on throttle control levers 1 and 4.

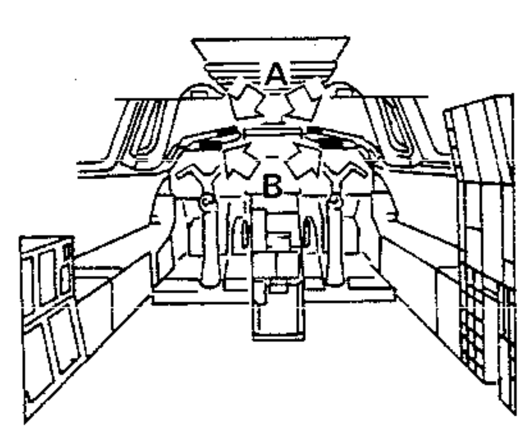
E. The excessive beam deviation indicator, comprising two horizontal bars, two vertical bars and a control aircraft symbol, indicates any deviation of the aircraft with respect to the ILS beam. It also indicates any ILS receiver or transmitter fault.

F. The LAND 2 and LAND 3 caption lights indicate automatic approach and landing capabilities as a function of the condition of the peripheral equipment associated with automatic landing.

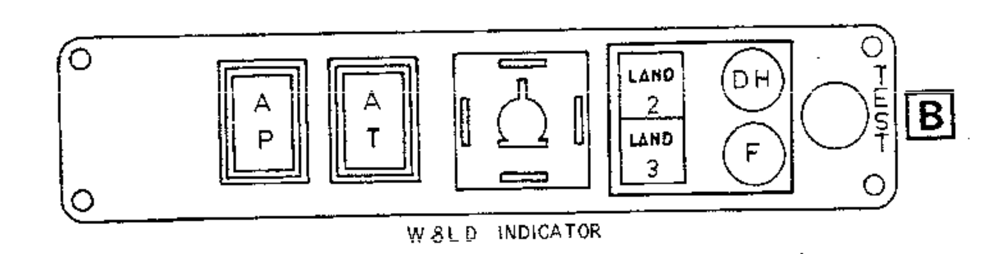
G. The DH caption light illuminates when the aircraft reaches the decision height preselected on the radio altimeter indicator.

B H. Deleted





FLIGHT COMPARTMENT



W & LD INDICATOR

CMA 22 00 00 0 AKMO

W & LD Indicator and AUTOLAND Warning Light
Figure 006

I. A TEST push-button is used to test the caption lights on the indicators and the excessive beam deviation thresholds inside the computers.

J. The AUTOLAND warning lights flash to indicate to the pilot that he cannot make use of automatic approach and landing.

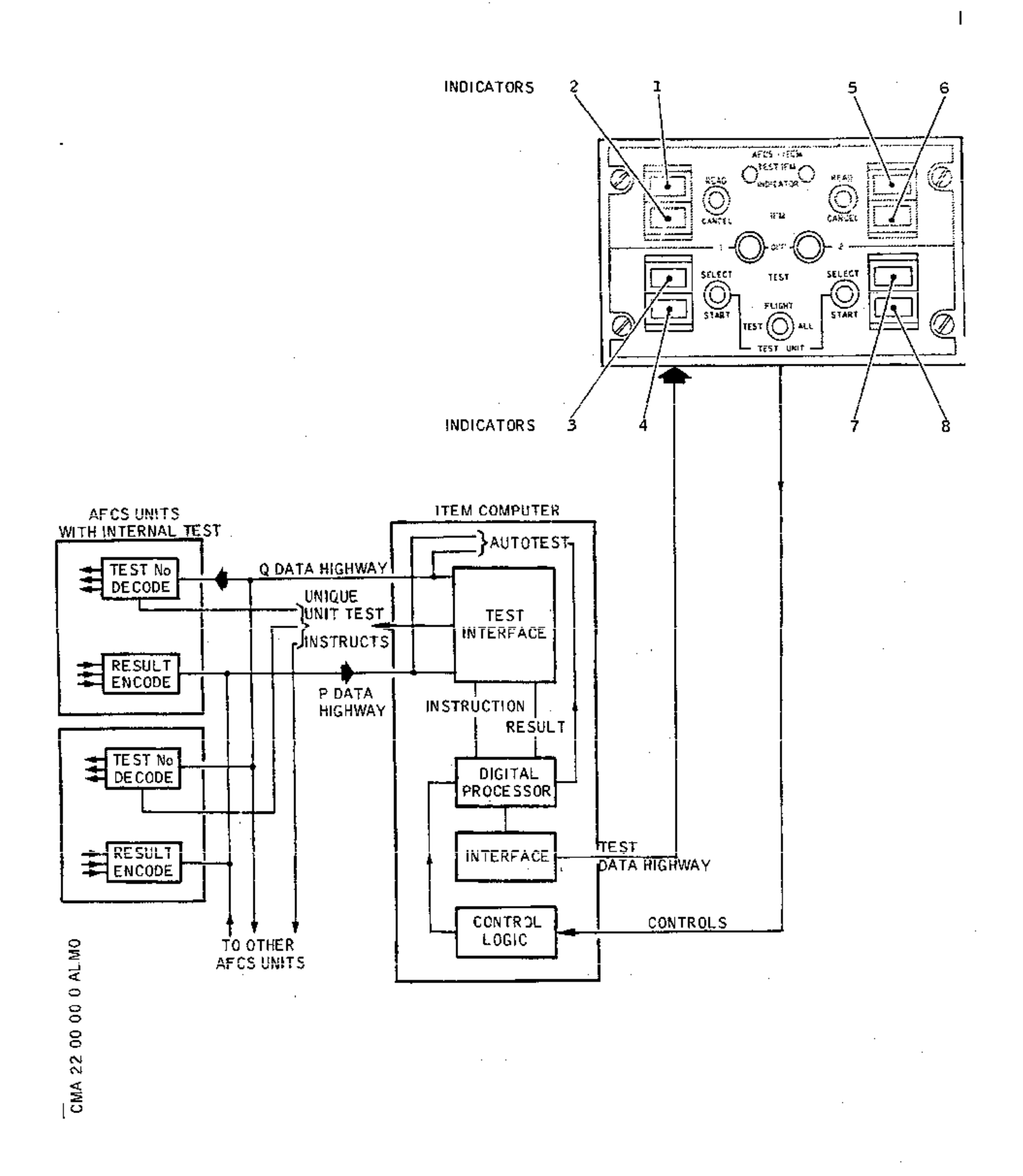
10. Integrated Test and Maintenance System (Ref. Fig.007 and 008)

The integrated test and maintenance (ITEM) system is used as and aid to trouble shooting for the AFCS computers and some of their associated sensors (rate-gyros, accelerometers).

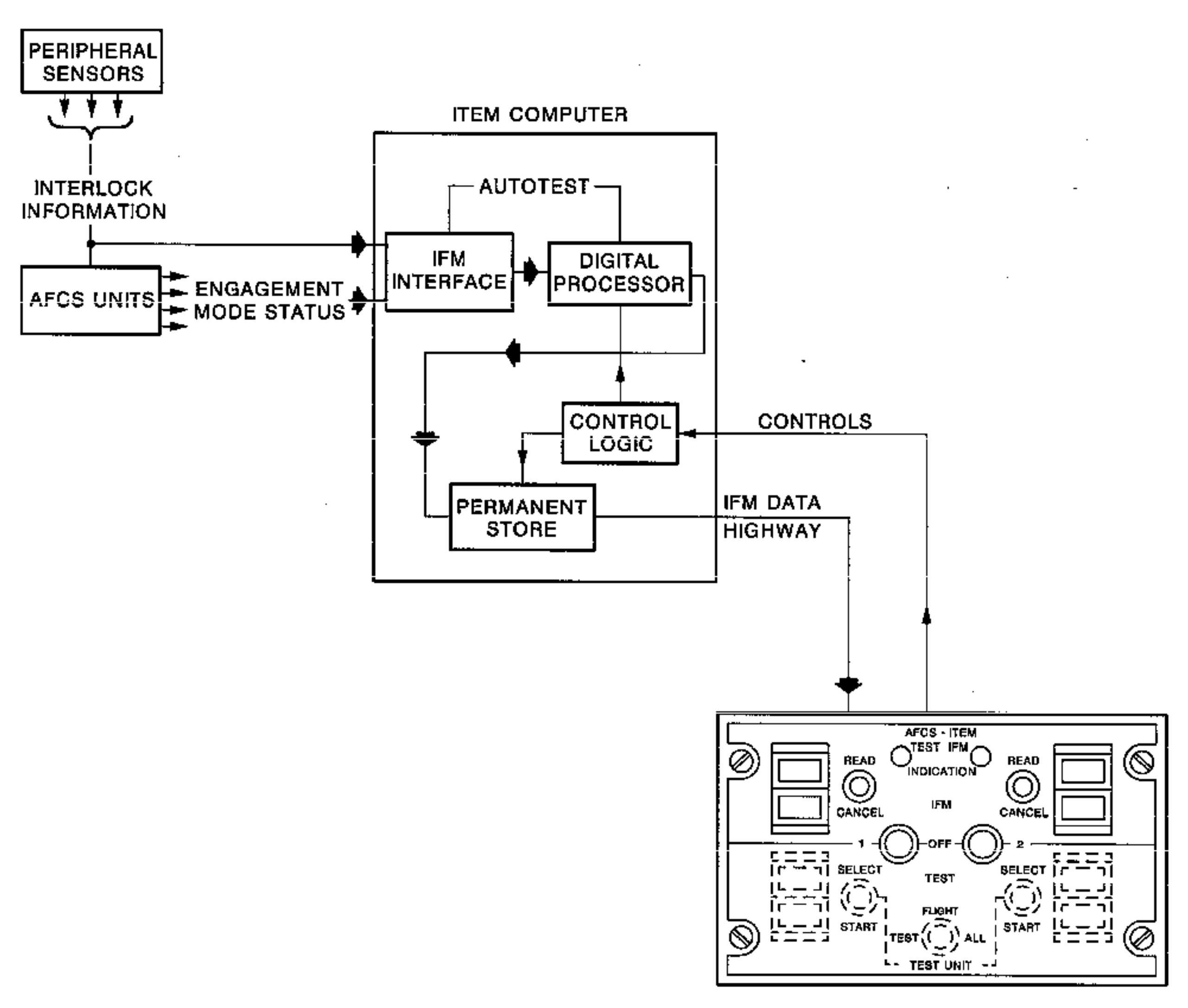
It enables a quick and accurate identification of the faulty component by means of two distinct modes of operation :
- TEST
- IFM (In Flight Monitoring)

The TEST mode comprises two functions, TEST ALL and TEST UNIT, which are performed on the ground, with the aircraft landing gear shock absorbers compressed. Each AFCS computer comprises test circuits to ensure automatic checking of the internal safety devices as well as to partially check the analog computation channels operation. The TEST mode is activated from the ITEM control and indicator panel. It allows a check either of any selected computer or of all the AFCS computers.

The IFM mode is used in flight. It allows the faulty unit which caused an AFCS system disconnection during flight to be detected. In this mode, the ITEM system also indicates the computer which cannot be operated and monitors the busbars of the systems concerned.



ITEM Interface TEST Function
Figure 007



ITEM Interface IFM Function
Figure 008

A. Table of indications in TEST or IFM mode

DISPLAY	FUNCTION	TEST MODE INDIC. SIDE 1	TEST MODE INDIC. SIDE 2	IFM MODE INDIC. SIDE 1	IFM MODE INDIC. SIDE 2
ITEM	ITEM being Tested	3	7	2	6
TEST	Test (being performed)	4	8		
ALL	End of test sequence	3	7		
PASS	Test passed	4	8		
FAIL	Test failed	4	8		
SFC	Safety flight controls	3	7	1	5
AP.P	Autopilot-pitch	3	7	1	5
AP.A	Autopilot-azimuth	3	7	1	5
AT	Autothrottle	3	7	1	5
AS.P	Autostabilizer-pitch	3	7	1	5
AS.R	Autostabilizer-roll	3	7	1	5
AS.Y	Autostabilizer-yaw	3	7	1	5
ET	Electric Trim	3	7	1	5
WLD	W & L Display	3	7	2	6
FD.P	FD. Pitch			1	5
FD.A	FD. Azimuth			1	5
INS	Inertial Navigation System & ISCU			1	5
ADS	Air Data System			2	6
INST	VSI or Altimeter			2	6
C.CP	Compass Coupler			2	6
HSI	Horizon Situation Indicator			2	6
RALT	Radio Altimeter			2	6
ILS	LOC or GLIDE Receiver			2	6
PWR	115V & 28V General Power Supply			2	6
COMP	Computer	4	8		
LAND	Automatic approach Computation channel	4	8		
GYRO	Rate gyro	4	8		
GYRO.M	Pitch AS monitoring Rate gyro	4	8		
ACCL	Accelerometer	4	8		

11. Terms and Abbreviations

A. The following list contains terms and abbreviations commonly used in this chapter.

ACCEL	Accelerometer
ACQ	Acquire
A/C	Aircraft
ADC	Air Data Computer

ALT	Altimeter or Altitude
AH	Altitude Hold
AAE	Altitude Acquire Engage
AAP	Altitude Acquire Prime
ATT	Attitude
ASI	Altitude Select Indicator
AFCS	Automatic Flight Control System
AP	Autopilot
AP/FD	Autopilot and Flight Director
AS	Autostabilizer
AT	Autothrottle
A/TRIM	Auto-Trim
ASA	Auxiliary Servo Arm
AZ	Azimuth
ADI	Attitude Director Indicator
BARO VERT SPEED	Barometric Vertical Speed
BDY	Boundary
BITE	Built-In-Test-Equipment
BUF	Buffer
CPY	Capability
CAPT	Capture
CAPTD	Captured
CTF	Central Test Facility
CNTR/LOCK	Centre Lock
C/O	Change Over
C	Control
CT	Control Transformer
CX	Control Transmitter
CDX	Control Differential Transmitter
C & M	Control and Monitor
COMPTR	Comparator
C 10	Comparator 10
COMP	Computer
C.CP	Compass. Coupler.
CP	Consolidated Point
C/UNIT	Control Unit
C/C	Cross Connection
CDI	Course Deviation Indicator
CSE	Course Set Error
D	Data
DT	Data Transfer
D/A UNIT	Datum Adjust Unit
DEMOD	Demodulator
DET	Detector
DEV	Deviation
DI	Digital Integrator
DISC	Disconnect
DME	Distance Measuring Equipment

ETI	Elapsed Time Indicator
ET	Electric Trim
E.SIG.AM	Electrical Signalling Amplifier
E.SIG.INTL	Electrical Signalling Interlock
EMERG	Emergency
ENERG	Energization
ENGA	Engage
ENGD	Engaged
ENGT	Engagement
E & C	Engaged and Clutched
E & H	Engaged and Healthy
ELP	Enter Land Phase
ESS	Essential
EV	Electrovalve
FAIL	Failure
FW	Failure Warning
FDBK	Feedback
FS	Feel Sensor
FT	Flare Test
FD	Flight Director
FI	Flight Idle
FU	Follow-Up
FREQ	Frequency
FTCM	Full-Time Command Modifier
GA	Gain Adjust
GS	Glide Slope
GSC	Glide Slope Capture
GSP	Glide Slope Prime
GSRX	Glide Slope Receiver
GSRX FW	Glide Slope Receiver Fail Warning
GXTRK	Glide Slope Track
GO/ARND	Go-Around
GND	Ground
HDG	Heading
HSI	Horizontal Situation Indicator
HYD	Hydraulic
ILL	Illuminate(d)-Illumination
INC	Incidence or Angle of Attack
IAS	Indicated Air Speed
IFM	In Flight Monitor
INS	Inertial Navigation System
ISCU	Inertial Signal Comparator Unit
I/P	Input
INST	Instructive
ILS	Instrument Landing System
ITEM	Integrated Test and Maintenance
INTEG	Integrator

INTL	Interlock
INT	Internal, Interrupt
Kt(s)	Knot(s)
LD	Landing Display
LP	Land Prime
LAT	Lateral
LS	Level Switch
LIM	Limit
LRU	Line Replaceable Unit
LOC	Localizer
LOC RX	Localizer Receiver
LOC RX FW	Localizer Receiver Failure Warning
LOC TRK	Localizer Track
LONG	Longitudinal
MSW	Microswitch
MWS	Master Warning System
MMO	Mach (Maximum Operating)
MAX OP	Maximum Operating
MAX TH	Maximum Thrust
MON	Monitor
NAV	Navigation
NEG	Negative
NO	Normally Open Switch Contact
NC	Normally Closed Switch Contact
O/C	Open Circuit
OPP	Opposite
O/P	Output
AS/P	Pitch-Autostabilizer
POS	Positive
POT	Potentiometer
PWR	Power
PSU	Power Supply Unit
PROM	Programmable Read Only Memory
PTC	Programmed Throttle Closure
P/BUT	Push Button
PFCU	Power Flight Control Unit
RA	Radio Altimeter
RAM	Random Access Memory
ROM	Read Only Memory
RX	Receiver
REC	Recorder
REG	Register
AS/R	Roll-Autostabilizer
RLY	Relay

SFC	Safety Flight Control
SPAD	Scratch Pad Memory
SEL	Select
ST	Self-Test
S/C	Short Circuit
SIG	Signal
SSI	Speed Select Indicator
STPC	Start Programme Throttle Closure
SUP	Supply
SV	Servo-valve
SW	Switch
SYNCH	Synchronizing
SYS	System
TG	Tachometer Generator
TACHO	Tachometer
TFL	Test For Land
TP	Test Point
TH	Throttle
THU	Track Heading Unit
TRK	Track
TURB	Turbulence
TMO	Temperature (Maximum Operating)
U/C	Undercarriage
VMO	Velocity (IAS) (Maximum operating)
VERT	Vertical
VS	Vertical Speed
VSI	Vertical Speed Indicator
VSR	Vertical Speed Rotate
VOR	VHF Omni Range
WARN	Warning
W & LD	Warning and Landing Display
W/O	Washout
WHL	Wheel
WP	Wiper
AS/Y	Yaw-Autostabilizer

12. System Management

Management of the various systems making up the AFCS is carried out using adjustment switches, engage switches, mode selection push-buttons and indicators which are located in the flight compartment, on the ceiling panel, glareshield, main instrument panels and centre console. Only ITEM management is carried out from the Flight Engineer's station (lower right-hand panel).
To carry out the various operations required to energize the AFCS systems, the aircraft must be supplied with electrical power as well as with other supplies such as hydraulic power and air conditioning.
(Ref. Fig. 009, 010 and 011)
B (Ref. Fig. 012, 013 and 014)
(Ref. Fig. 015)

HDG HOLD PUSH BUTTON LIGHT (WHITE)

PRESSED - HOLDS THE EXISTING MAGNETIC HEADING.
ON - INDICATES ENGAGEMENT OF THE MODE.

HDG HOLD IS A BASIC AUTOPILOT MODE AND IS ENGAGED WHEN AUTOPILOT IS SELECTED.

TURB PUSH BUTTON LIGHT (WHITE)

PRESSED - HOLDS THE EXISTING PITCH ATTITUDE AND HEADING AND REDUCES THE TRIM RATE OF THE ELECTRIC TRIM SYSTEM.

TURB MODE IS SPECIFIC TO THE AUTOPILOT.

GO-AROUND LIGHT (WHITE)

ON - INDICATES THAT AUTOMATIC GO-AROUND HAS BEEN INITIATED.

PITCH HOLD BUTTON LIGHT (WHITE)

PRESSED - HOLDS THE EXISTING ATTITUDE.
ON - INDICATES ENGAGEMENT OF THE MODE.

PITCH HOLD IS A BASIC AUTOPILOT MODE AND IS ENGAGED WHEN AUTOPILOT IS SELECTED.

LAND PUSH BUTTON LIGHT (WHITE)

PRESSED - ENGAGES BOTH THE VOR LOC AND GLIDE MODES.
ON - INDICATES SUCCESSFUL CAPTURE OF THE LOC BEAM AND GLIDE BEAM.

DURING ACQUISITION THE PRIME LIGHT (WHITE) IS ON ACCOMPANIED BY VOR LOC PRIME (WHITE) AND GLIDE PRIME LIGHT (WHITE).

MACH HOLD PUSH BUTTON LIGHT (WHITE)

PRESSED - HOLDS THE EXISTING MACH NUMBER.
ON - INDICATES ENGAGEMENT OF THE MODE.

GLIDE PUSH BUTTON LIGHT (WHITE)

PRESSED - ENGAGES BOTH GLIDE AND LOC MODES.
ON - INDICATES SUCCESSFUL CAPTURE OF THE GLIDE BEAM; SUCCESSFUL CAPTURE OF THE LOC BEAM IS INDICATED BY THE LOC LIGHT ON.

DURING ACQUISITION THE PRIME LIGHTS (WHITE) OF BOTH GLIDE AND LOC ARE ON.

MAX CLIMB PUSH BUTTON LIGHT (WHITE)
PRESSED-AP/FD HOLDS IAS = 530Kts
ON-INDICATES ENGAGEMENT OF THE MODE
NOTE : THE AT IS ARMED BUT NOT ACTIVE, AND NO MODE IS INDICATED

MAX CRUISE LIGHT (WHITE)
ON-INDICATES AUTOMATIC CHANGE TO MAX CRUISE MODE
NOTE : THE AT ENGAGES AUTOMATICALLY, INDICATING MACH HOLD MODE

INS PUSH BUTTON LIGHT (WHITE)

PRESSED - INITIATES THE ACQUISITION AND SUBSEQUENT HOLD OF THE TRACK BETWEEN THE TWO WAY POINTS SET IN THE INS.
ON - INDICATES ENGAGEMENT OF THE MODE.

BACK BEAM PUSH BUTTON LIGHT (WHITE)

THIS MODE IS SPECIFIC TO THE FLIGHT DIRECTOR AND CAN ONLY BE USED WITH THE AUTOPILOT DISENGAGED.

PRESSED - PERMITS CAPTURE AND TRACKING OF A BACK BEAM LOC.

HDG/TRK PUSH BUTTON LIGHT (WHITE)

PRESSED - INITIATES THE ACQUISITION AND SUBSEQUENT HOLD OF THE PRESELECTED TRACK OR HEADING.

ON - INDICATES SUCCESSFUL CAPTURE OF THE TRACK OR HEADING.

VOR LOC PUSH BUTTON LIGHT (WHITE)

PRESSED - INITIATES THE ACQUISITION AND SUBSEQUENT HOLD OF THE SELECTED VOR RADIAL (OR LOC).
ON - INDICATES SUCCESSFUL CAPTURE OF THE RADIAL.

DURING THE ACQUISITION THE PRIME LIGHT IS ON (WHITE).

IAS HOLD PUSH BUTTON LIGHT (WHITE)

PRESSED - HOLDS THE EXISTING AIRSPEED.
ON - INDICATES ENGAGEMENT OF THE MODE.

ALT HOLD PUSH BUTTON LIGHT (WHITE)

PRESSED - HOLDS THE EXISTING ALTITUDE.
ON - INDICATES ENGAGEMENT OF THE MODE.

VERT SPEED PUSH BUTTON LIGHT (WHITE)

PRESSED - HOLDS THE EXISTING VERTICAL SPEED.
ON - INDICATES ENGAGEMENT OF THE MODE.

ALT ACQ PUSH BUTTON LIGHT (WHITE)

PRESSED - INITIATES THE ACQUISITION OF THE ALTITUDE SET ON THE ALTITUDE SELECT.

UPON SELECTION OF ALT ACQ THE PRIME LIGHT WILL COME ON AND THE AIRCRAFT WILL REMAIN UNDER THE CONTROL OF THE PREVIOUS MODE.

HDG PULL/TRK PUSH SELECTORS (2)

SELECTS HEADING OR TRACK ON THE CORRESPONDING HSI.

VOR/LOC SELECTORS (2)

SELECTS VOR/LOC COURSE ON THE CORRESPONDING HSI.

AP1 AND AP2 LIGHTS (GREEN)

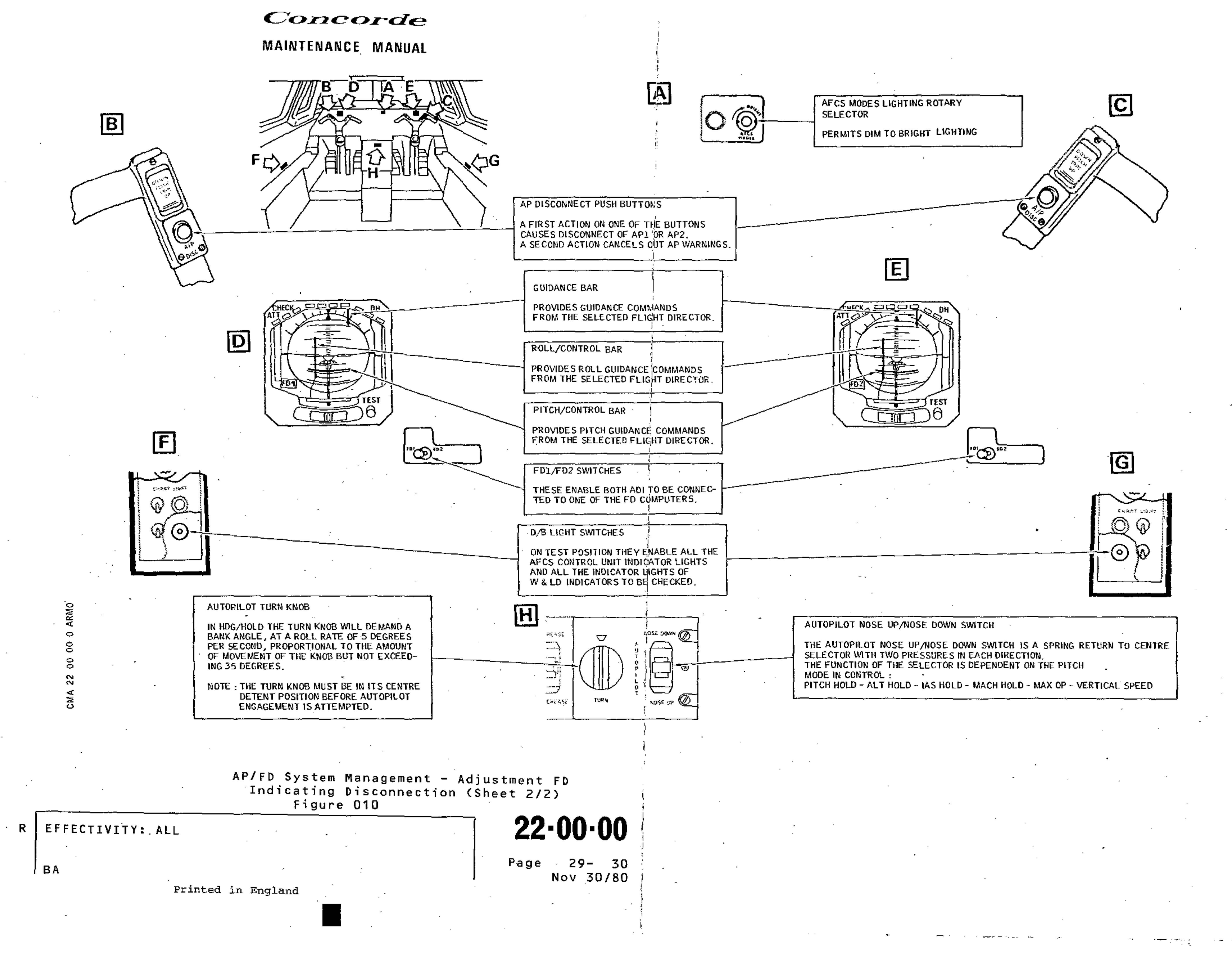
ON - INDICATES ENGAGEMENT OF THE ASSOCIATED AUTOPILOT CHANNEL.

AUTOPILOT AND FLIGHT DIRECTOR ENGAGE SWITCHES

THE ENGAGE SWITCH FOR EACH AUTOPILOT AND FLIGHT DIRECTOR CHANNEL IS SOLENOID HELD IN THE ENGAGE POSITION ONLY WHEN THE ASSOCIATED CHANNEL HAS BEEN SATISFACTORILY ENGAGED. THUS THE POSITION OF THE SWITCH ALWAYS INDICATES THE ENGAGEMENT STATE OF THE CHANNEL.

CMA 22 00 00 0 APUO

AP/FD System Management - Engagement Mode Selection (Sheet 1/2)
Figure 009

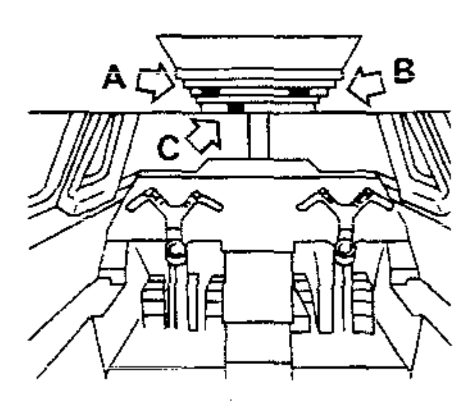


AP/FD System Management - Adjustment FD Indicating Disconnection (Sheet 2/2)
Figure 010



STAB

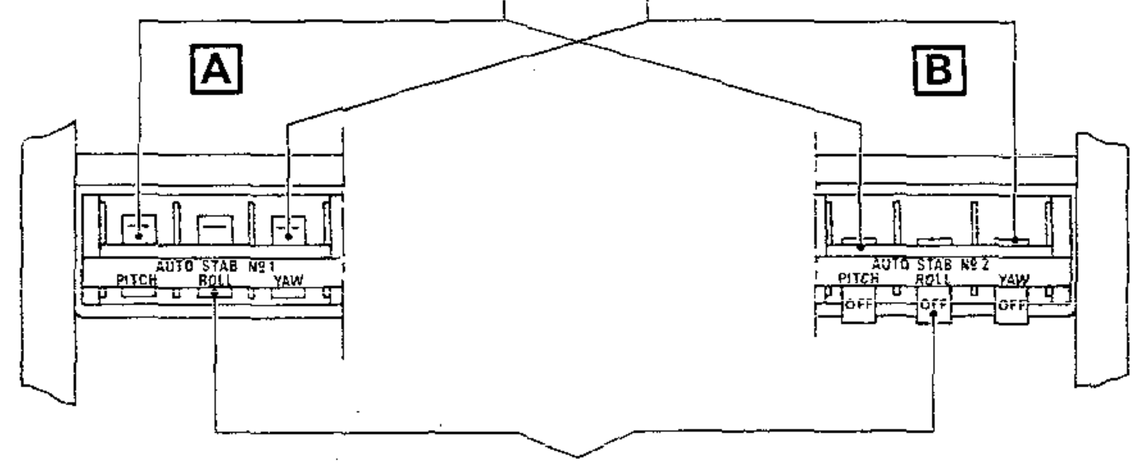
SYSTEM WARNING LIGHT.
ILLUMINATES IN RED ON COMPLETE LOSS OF AUTOSTABILIZATION ON AN AXIS.



AUTOSTABILIZATION Nº 1 AND Nº 2 PITCH ENGAGE SWITCHES
THE ENGAGEMENT OF EITHER OR BOTH SWITCHES CAUSES AUTOSTABILIZATION TO OPERATE ON PITCH AXIS, PROVIDED THE LOGIC CONDITIONS SPECIFIC TO THIS AXIS AS WELL AS THE LOGIC CONDITIONS ASSOCIATED WITH SUPER-STABILIZATION FUNCTION AND SAFETY FLIGHT CONTROL FUNCTION, WHEN ACTIVATED, ARE FULFILLED.

AUTOSTABILIZATION Nº 1 AND Nº 2 YAW ENGAGE SWITCHES

THE ENGAGEMENT OF EITHER OR BOTH SWITCHES CAUSES AUTOSTABILIZATION SYSTEM TO OPERATE ON YAW AXIS, PROVIDED ALL THE LOGIC CONDITIONS SPECIFIC TO THIS AXIS AS WELL AS THE LOGIC CONDITIONS ASSOCIATED WITH HIGH ANGLE-OF-ATTACK YAWING COUNTERACTION, ARE FULFILLED.

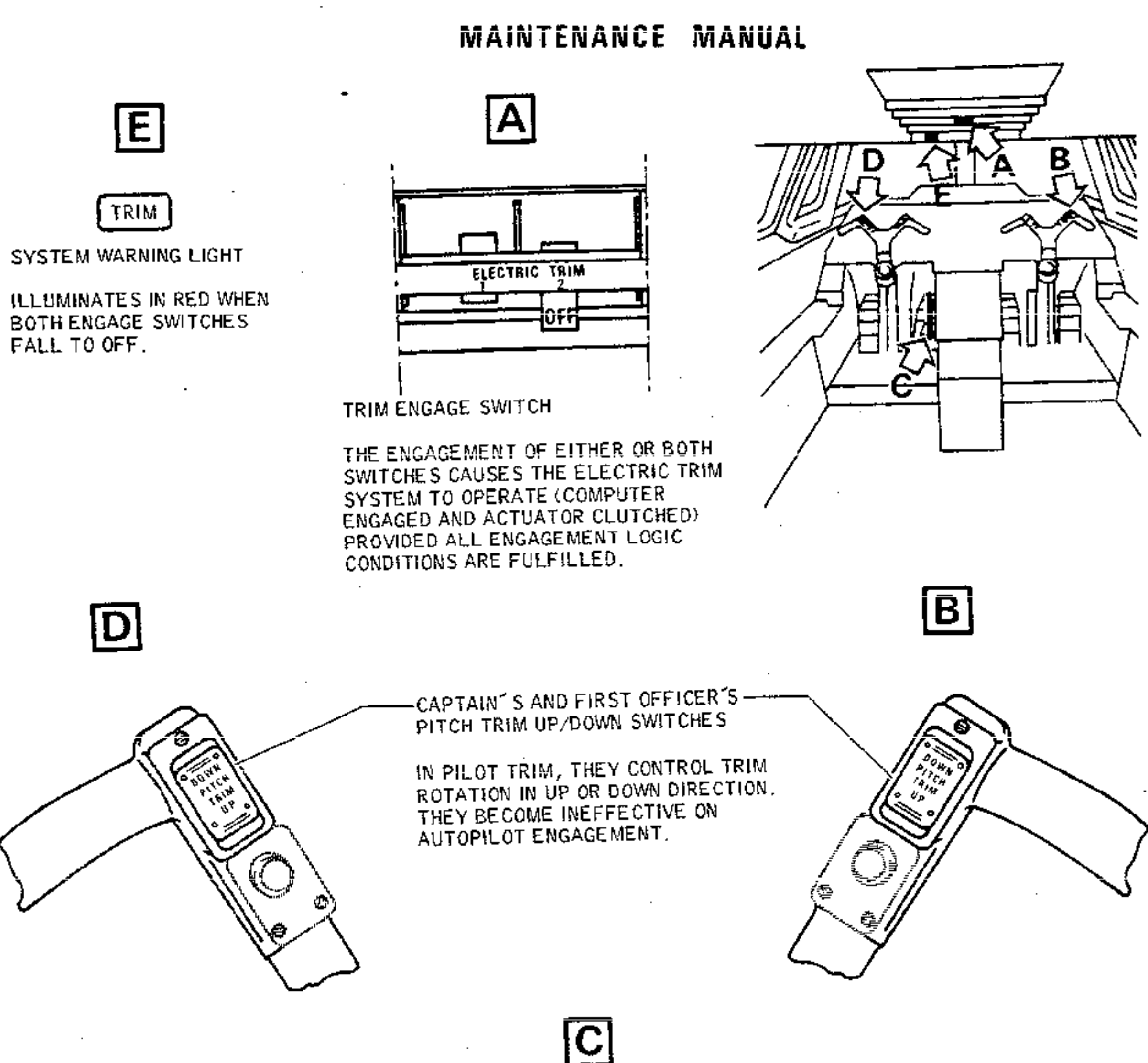


AUTOSTABILIZATION Nº1 AND Nº2 ROLL ENGAGE SWITCHES

THE ENGAGEMENT OF EITHER OR BOTH SWITCHES CAUSES AUTOSTABILIZATION SYSTEM TO OPERATE ON ROLL AXIS, PROVIDED ALL THE LOGIC CONDITIONS SPECIFIC TO THIS AXIS AS WELL AS THE LOGIC CONDITIONS ASSOCIATED WITH SAFETY FLIGHT CONTROL FUNCTION, WHEN ACTIVATED, ARE FULFILLED.

CMA 22 00 00 0 ASM0

Autostabilization System Management
Figure 011



YAW TRIM

PITCH TRIM

ROLL TRIM

PITCH TRIM HANDWHEEL

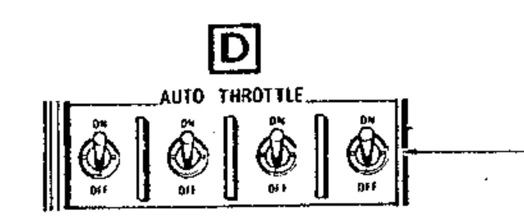
ROTATES ON AUTOMATIC OR PILOT CONTROL ORDER TO THE SYSTEM. ITS ROTATION CAUSES A RATTLE AURAL WARNING SOUND.

TRIM ROTATION INDICATOR

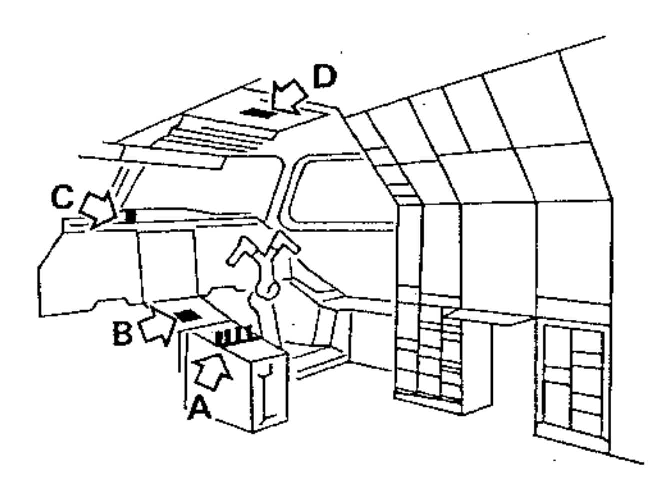
READING RANGE IS FROM +8 DEGREES IN NOSE-DOWN SENSE TO -15 DEGREES IN NOSE-UP SENSE. A DEFLECTION GREEN RANGE OF -1 DEGREE TO +3.5 DEGREES SHOWS THE POSITION IN WHICH THE TRIM CONTROL WHEEL IS TO BE SET BEFORE TAKING-OFF.

CMA 22 00 00 0 AUMO

Electric Trim System Management
Figure 012



WHEN AN ISOLATION SWITCH IS PLACED IN OFF POSITION, THE ASSOCIATED THROTTLE LEVER IS ISOLATED AS A RESULT OF 28VDC TO CORRESPONDING CLUTCH CUT-OUT. THE THREE OTHER THROTTLE LEVERS REMAIN OPERATIVE.

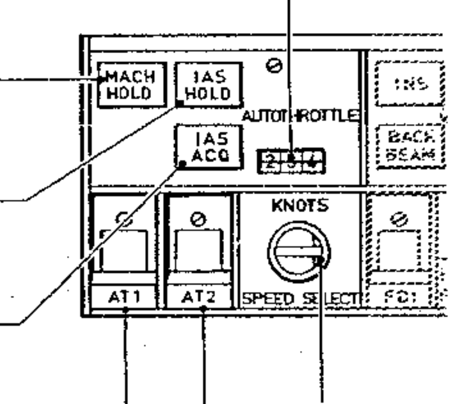


ENABLES INDICATION OF THE SELECTION DONE BY ROTATING SPEED SELECT KNOB. THE COUNTER BAR DISAPPEARS WHEN IAS ACQ MODE HAS BEEN SELECTED.

MACH HOLD MODE SELECTION PUSH-BUTTON. THIS MODE IS SELECTED BY PRESSING THIS PUSH-BUTTON WHICH ILLUMINATES INDICATING THAT THE SYSTEM IS ENGAGED IN THIS MODE. THIS MODE ENGAGES AUTOMATICALLY WHEN THE AP/FD MAX CRUISE MODE IS ENGAGED

IAS HOLD MODE SELECTION PUSH-BUTTON. IT IS THE SYSTEM BASIC MODE. THIS PUSH-BUTTON ILLUMINATES AS SOON AS AT1 OR AT2 SWITCH IS PLACED IN ON POSITION.

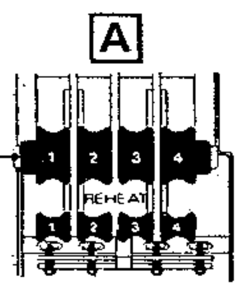
IAS ACQ MODE SELECTION PUSH-BUTTON. THIS MODE IS SELECTED BY PRESSING THIS PUSH-BUTTON WHICH ILLUMINATES, INDICATING THE SYSTEM IS ENGAGED IN THIS MODE - THIS SELECTION CAUSES THE BAR ON THE KNOTS COUNTER TO DISAPPEAR.

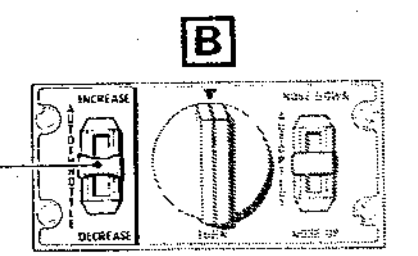


ENABLES TO VARY KNOTS COUNTER DISPLAY FROM 130 TO 400 KTS BY KNOB ROTATION. THIS SELECTION IS DONE BEFORE IAS ACQ MODE SELECTION AND CAN BE MODIFIED WHILE THE MODE IS OPERATIVE.

ONCE AT1 OR (AND) AT2 SWITCHES ARE PLACED IN ON POSITION, THE ASSOCIATED SYSTEM (S) IS (ARE) ENGAGED, IF THE LOGIC CONDITIONS ARE SATISFACTORY. 28VDC SUPPLIES THE ACTUATOR CLUTCHES THROUGH THE ISOLATION SWITCHES.

WHEN AT INSTINCTIVE DISCONNECT PUSH BUTTONS No. 1 OR No. 4 ARE PRESSED THEY CAUSE THE SYSTEM TO DISENGAGE BY -15VDC CUT-OUT IF PRESSED A SECOND TIME THEY WILL CANCEL THE AT WARNING CAUSED BY AT DISENGAGEMENT.

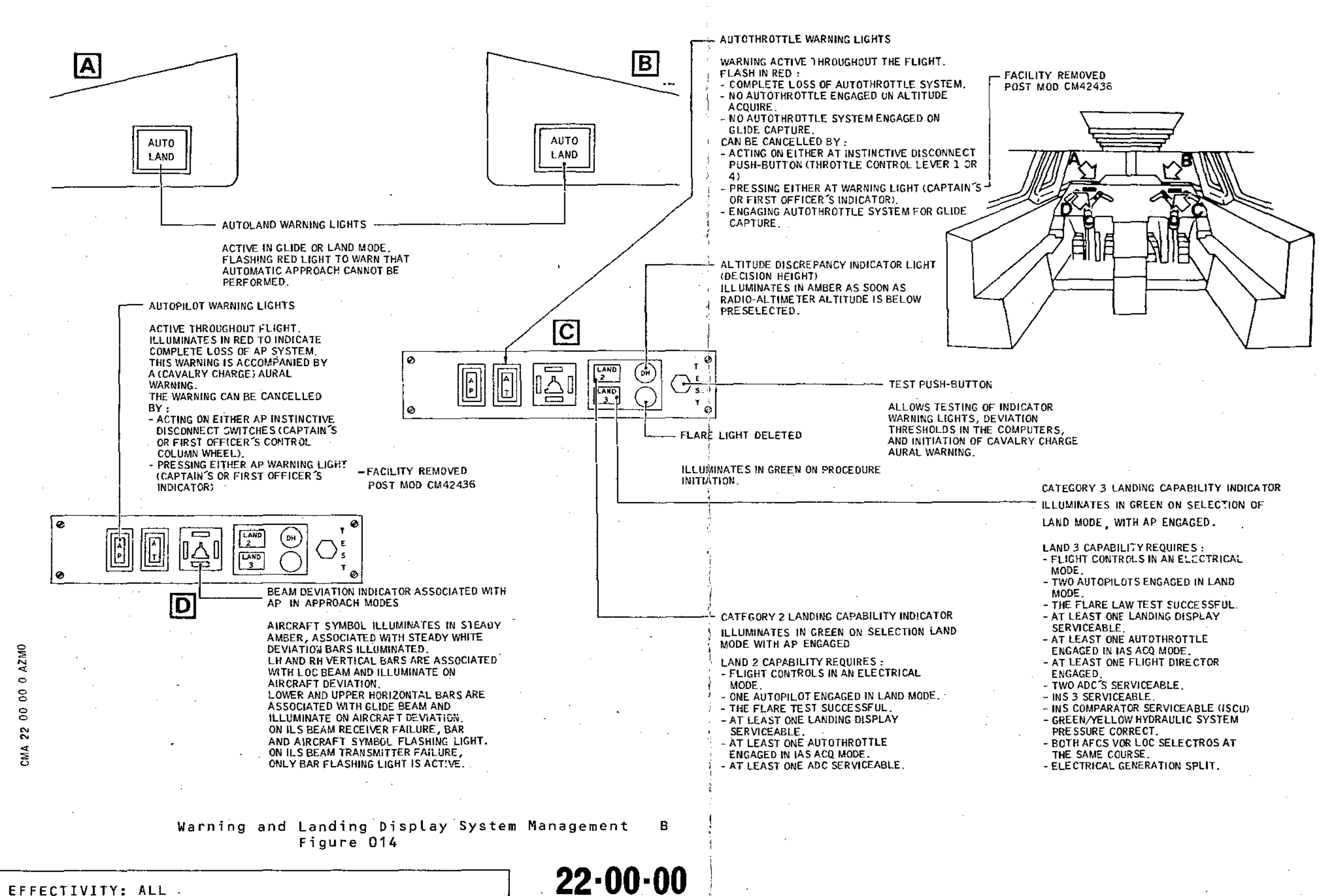




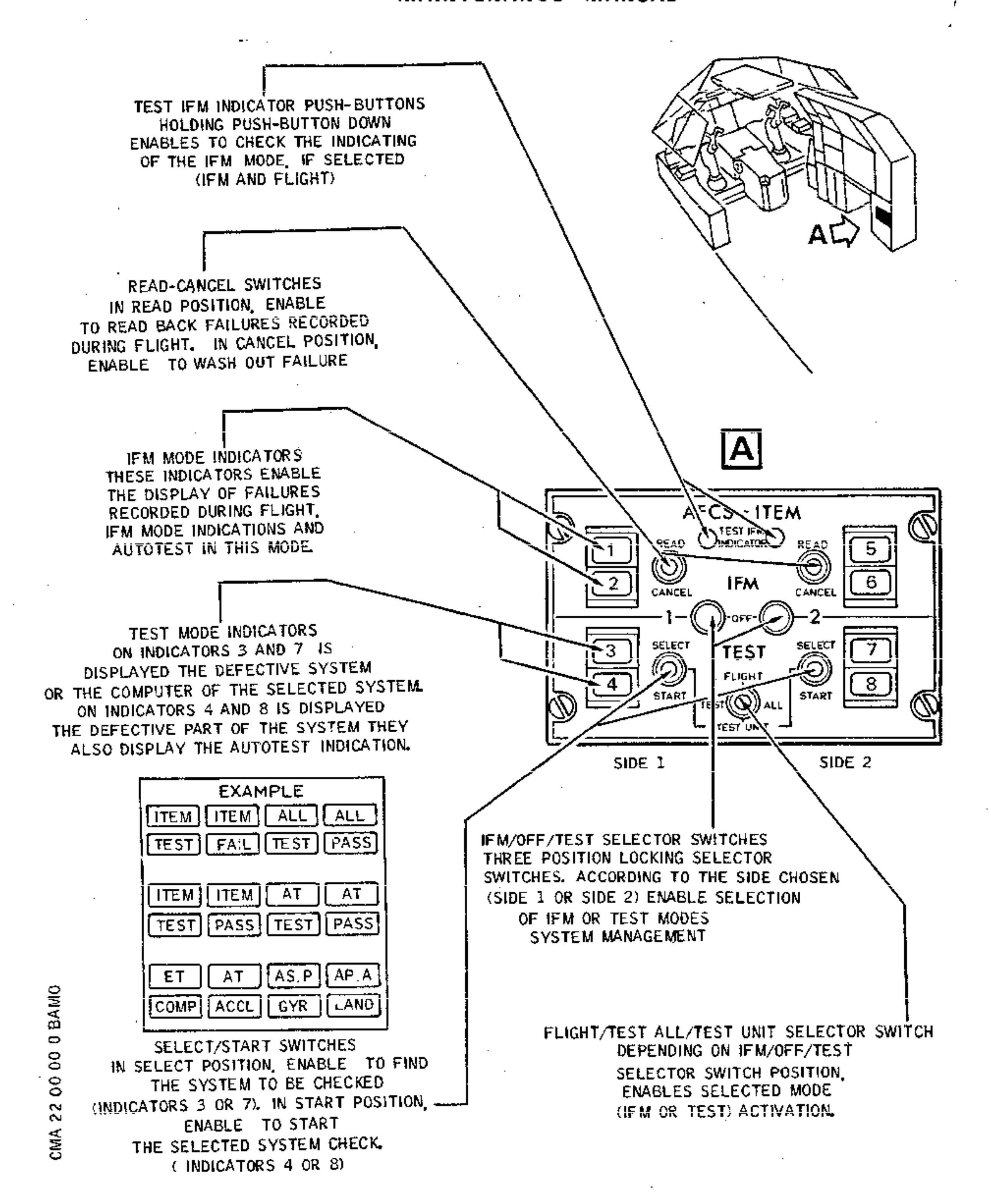
THE TOGGLE SWITCH IS ONLY ACTIVE IN IAS HOLD AND MACH HOLD MODES WHEN PLACED IN INCREASE OR DECREASE POSITION. IT CHANGES THE DATUM STORE CONDITION AND RESULTS IN VARIATION DEPENDING ON THE TIME OF ACTION IN THE REFERENCE SPEED AND REFERENCE MACH ADJUST RANGE AS PER SELECTED MODE.
THE DATUM ADJUST UNIT MUST NOT BE USED IN MACH HOLD MODE WHEN THE AP/FD IS IN MAX CRUISE MODE

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Autothrottle System Management
Figure 013



Warning and Landing Display System Management B
Figure 014



ITEM System Management
Figure 015

13. Flight Compartment Preparation Check

- AUTOTHROTTLE isolation switches	ON
- ANTISTALL SYSTEM 1 switch	ON
- SYST FAIL light (amber)	ON
- ANTI STALL SYSTEM 2 switch	ON
- SYST 2 FAIL light (amber)	ON
- AUTOSTAB No.1 PITCH-ROLL-YAW switches	Engage Remain engaged
- AUTOSTAB No.2 PITCH-ROLL-YAW switches	Engage Remain engaged
- SYS 1 and SYS 2 FAIL lights (amber)	OFF
- ELECTRIC TRIM 1 switch	Engage Remains engaged
- ELECTRIC TRIM 2 switch	Engage Remains engaged
- PITCH-TRIM UP-DOWN switch - Captain	Set and hold UP
Control columns and pitch trim control wheel	Respond to the order
Rattle aural warning	Sounds
- PITCH TRIM UP-DOWN switch - Captain	Release
Control columns and pitch trim control wheel	Stop
- PITCH TRIM UP-DOWN switch - Captain	Set and hold DOWN
Control columns and pitch trim control wheel	Respond to the order
Rattle aural warning	Sounds
- Pitch trim control wheel	Neutral position
- PITCH TRIM UP-DOWN switch - Captain	Release
Control columns and pitch trim control wheel	
- AUTOPILOT TURN knob	Centred
- AP 1 switch	Engage Remains engaged
- AP 1 light (green)	ON
- PITCH HOLD push button light (white)	ON
- HDG HOLD push button light (white)	ON
- AP2 switch	Engage Remains engaged
- AP2 light (green)	ON
- AP1 switch	drops to OFF
- AP1 light	OFF
- AP DISC pushbutton - Captain	Press and release
- AP2 switch	drops to OFF
- AP2 light	OFF
- PITCH HOLD push button light	OFF
- HDG HOLD push button light	OFF
- AP push button warning lights (red)	ON

Both W & LD indicators	
- Cavalry charge aural warning	Sounds
- AP DISC pushbutton - Captain	Press again
- AP pushbutton warning lights - Both W & LD indicators	OFF
- FD1/FD2 switch - Captain	Set to FD1
- FD1/FD2 switch -First Officer	Set to FD2
- FD1 switch	Engage
	Remains engaged
- PITCH HOLD push button light (white)	ON
- Pitch FD bar - Captain's ADI	Appears
- HDG TRK pushbutton light	Press
- HDG TRK pushbutton light (white)	ON
- Roll FD bar - Captain's ADI	Appears
- FD2 switch	Engage
	Remains engaged
- Pitch and Roll FD bars - First Officer's ADI	Appear
- FD1/FD2 switch - Captain	Set to FD2
- Pitch and roll FD bars - Captain's ADI	Remain
- FD1 switch	OFF
- FD2 switch	OFF
- PITCH HOLD pushbutton light	OFF
- HDG TRK pushbutton light	OFF
- Pitch and roll FD bars - Both ADIs	Disappear
- FD1/FD2 switch - Captain	Set to FD1
- IFM-OFF-TEST selector switches 1 and 2	OFF
- FLIGHT-TEST ALL-TEST UNIT selector switch	FLIGHT
- IFM-OFF-TEST selector switches 1 and 2	Set to IFM
All indicators after 50 seconds	Show Blank
- AT1 - AT2 - FD1 - FD2 - AP1 - AP2 switches	OFF
- AT1 switch	Engage
	Remains engaged
- IAS HOLD pushbutton light (white)	ON
Throttle levers	Move from Idle position
- AT2 switch	Engage
	Remains engaged
- AT instinctive disconnect push buttons (Throttles No.1, No.4)	Press and release
- AP1 and AT2 switches	Drop to OFF
- IAS HOLD push button light	OFF
- AT pushbutton warning light (red)	Flashing

(on both warning & landing display indicators)	
- AT1 instinctive disconnect push button	Press again
- AT pushbutton warning light	OFF
- Throttle levers	Set to Idle position
- TEST push button (on Captain's warning & landing display indicator)	Press and hold
- AP warning light (red) - Captain	ON
- AT warning light (red) - Captain	ON
- ILS beam deviation bars (white) - Captain	Illuminated
- Aircraft symbol (amber) - Captain	Illuminated
- LAND 2 and LAND 3 lights (green) - Captain	ON
- DH light (amber) - Captain	ON
- AP pushbutton warning light (red) - First Officer	ON
- AT pushbutton warning light (red) - First Officer	Flashing
- ILS beam deviation bars (white) First Officer	Illuminated
- Aircraft symbol (amber) - Captain	Illuminated
- Cavalry charge aural warning	Sounds
- AUTO LAND lights (red) - Captain's and First Officer's indicators	Flashing
- TEST pushbutton - Captain	Release
- ALL lights	OFF
- TEST pushbutton - (on First Officer's warning & landing display indicator)	Press and hold
- AP pushbutton warning light (red) - First Officer	ON
- AT pushbutton warning light (red) - First Officer	ON
- ILS beam deviation bars (white) - First Officer	Illuminated
- Aircraft symbol (amber) - First Officer	Illuminated
- LAND 2 and LAND 3 lights (green) First Officer	ON
- DH light (amber) - First Officer	ON
- AP pushbutton warning light (red) - Captain	ON
- AT pushbutton warning light red - Captain	Flashing
- ILS beam deviation bars (white) - Captain	Illuminated
- Aircraft symbol (amber) - Captain	Illuminated

- Cavalry charge aural warning	Sounds
- AUTO LAND lights (red)	Flashing
- TEST pushbutton - First Officer	Release
- ALL lights	OFF
- AFCS MODES lighting rotary selector	Set as required

14. Power Supply
(Ref. Fig. 016)

The various AFCS system components are power supplied through busbars.

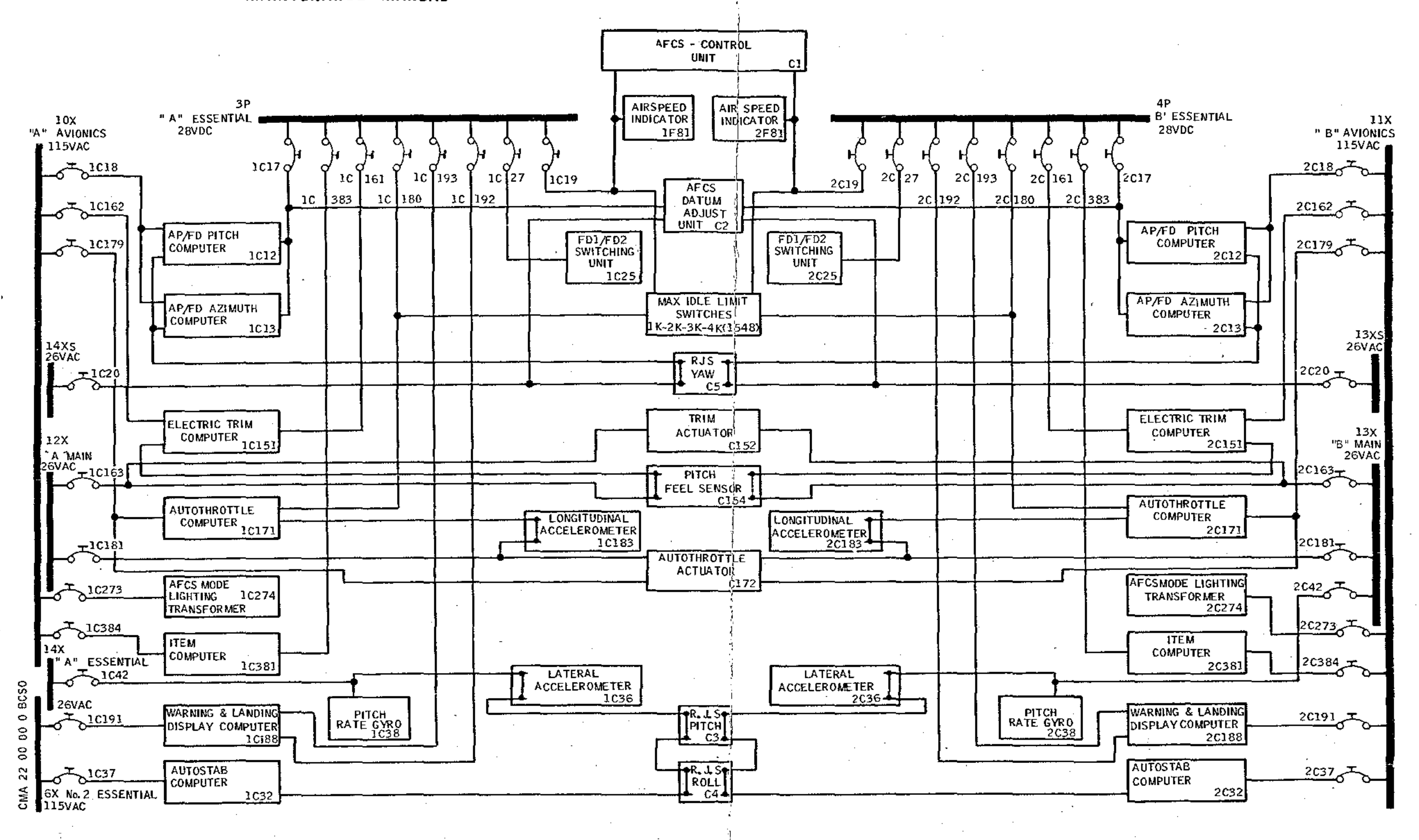
The (28VDC) DC supply is obtained through essential busbars 3P and 4P.

The (115VAC) AC supply is obtained mainly through sheddable avionics busbars, and through the No.2 essential busbars for lane 1 of the autostabilization and warning and landing display systems.

The (26VAC) AC supply is obtained directly through the essential busbars, with the exception of the AP/FD. This is supplied with 26V 400 Hz through two supplementary busbars 14XS and 13XS which are energized respectively through two circuit breakers X355 and X345 located on panels 2-213 and 13-216.

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AFCS Power Supply Distribution
Figure 016

SERVICE	BUSBAR	C/B	PANEL
AP/FD SYS 1 CONT	"A" ESSENTIAL	3P	1-213
FD1/FD2 1ST PLT SW SUP	"A" ESSENTIAL	3P	1-213
AP/FD COMP 1 SUP	"A" AVIONICS SHEDDABLE	10X	13-215
AP/FD SYS 1 SUP	"A" MAIN	14XS	2-213
AP/FD SYS 2 CONT	"B" ESSENTIAL	4P	5-213
FD1/FD2 2ND PLT SW SUP	"B" ESSENTIAL	4P	5-213
AP/FD COMP 2 SUP	"B" AVIONICS SHEDDABLE	11X	13-216
AP/FD SYS 2 SUP	"B" MAIN	13XS	13-216
AUTOSTAB 1 COMP SUP	No.2 ESSENTIAL	6X	2-213
LAT ACCELMTR 1 26 V SUP	"A" ESSENTIAL	14X	2-213
AUTOSTAB 2 COMP SUP	"B" AVIONICS SHEDDABLE	11X	13-216
LAT ACCELMTR 2 26V SUP	"B" MAIN	13X	13-216
TRIM 1 CONT	"A" ESSENTIAL	3P	1-213
TRIM COMP 1 SUP	"A" AVIONICS SHEDDABLE	10X	13-215
TRIM SYNCHRO SYS 1 SUP	"A" MAIN	12X	13-215
TRIM 2 CONT	"B" ESSENTIAL	4P	5-213
TRIM COMP 2 SUP	"B" AVIONICS SHEDDABLE	11X	13-216
TRIM SYNCHRO SYS 2 SUP	"B" MAIN	13X	13-216
AT CONT	"A" ESSENTIAL	3P	1-213
AFCS 1 CONT	"A" ESSENTIAL	3P	1-213
AT SYS 1 SUP	"A" AVIONICS SHEDDABLE	10X	13-215
AT SYNCHRO SYS 1 SUP	"A" MAIN	12X	13-215
AT CONT	"B" ESSENTIAL	4P	5-213
AFCS 2 CONT	"B" ESSENTIAL	4P	5-213
AT SYS 2 SUP	"B" AVIONICS SHEDDABLE	11X	13-216
AT SYNCHRO SYS 2 SUP	"B" MAIN	13X	13-216
WARN & LDG DISPLAY 1 SUP 2	"A" ESSENTIAL	3P	1-213
WARN & LDG DISPLAY 1 SUP 1	"A" ESSENTIAL	3P	1-213
LDG DISPLAY SYS 1 SUP	No.2 ESSENTIAL	6X	2-213
WARN & LDG DISPLAY 2 SUP 1	"B" ESSENTIAL	4P	5-213

SERVICE	BUSBAR		C/B PANEL
WARN & LDG DISPLAY 1 SUP 2	"B" ESSENTIAL	4P	5-213
LDG DISPLAY SYS 2 SUP	"B" AVIONICS SHEDDABLE	11X	13-216
AFCS TEST 1 28 V SUP	"A" ESSENTIAL	3P	1-213
AFCS TEST 1 115V SUP	"A" AVIONICS SHEDDABLE	10X	13-215
AFCS TEST 2 28V SUP	"B" ESSENTIAL	4P	5-213
AFCS TEST 2 115V SUP	"B" AVIONICS SHEDDABLE	11X	13-216
AFCS MODE SYST 1 LTS SUP	"A" AVIONICS SHEDDABLE	10X	13-215
AFCS MODE SYST 2 LTS SUP	"B" AVIONICS SHEDDABLE	11X	13-216

TROUBLE SHOOTING

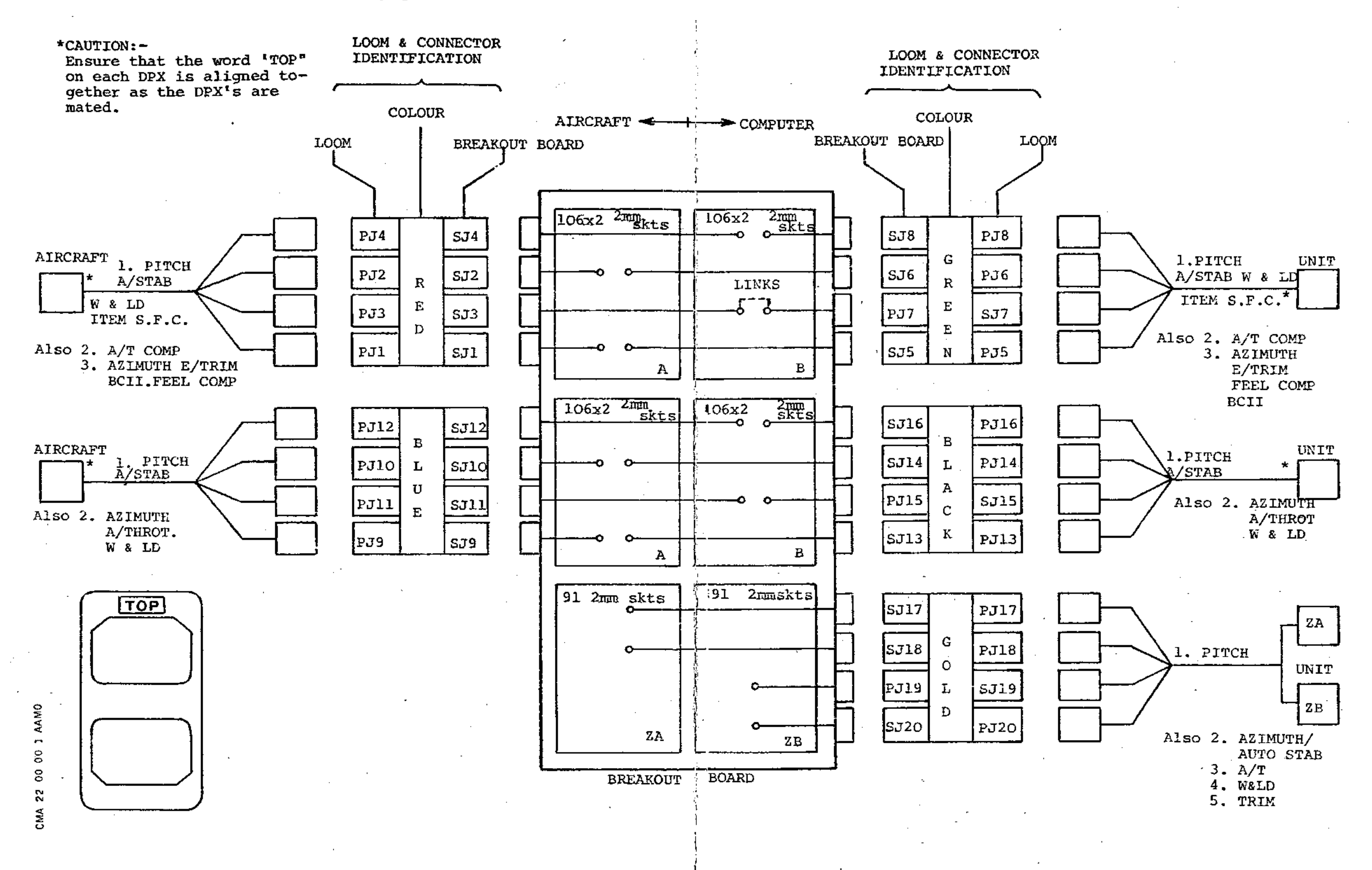
1. General

Trouble Shooting :- Use of the Brensal Electronics AFCS Break Out Board Set. P/N TE 6033 Stores Code GEEB0323.
The AFCS LRU's can be broken out of the aircraft racking by using the AFCS Breakout Board set which consists of a Breakout board and associated looms. The Breakout Board set gives access to DPX connections and hence the functions on the pins of the computer selected for breakout can be measure. The Breakout Board consists of 2 x 91 socket panels and 4 x 212 socket panels, the latter having removable shorting links fitted to each pair of sockets. To eliminate errors, coloured identification labels are attached to both the loom connectors at the breakout board end and the breakout board connectors which mate with the looms. (Ref. Fig. 101)

CAUTION : IT IS IMPERATIVE THAT THE DPX OF THE AIRCRAFT JUNCTION BOX IS CHECKED TO BE CONNECTED VIA THE BREAKOUT BOARD TO THE ASSOCIATED DPX ON THE LRU AND THAT IT IS NOT CROSSED OVER TO THE UNASSOCIATED DPX.
DAMAGE TO THE LRU WILL OCCUR IF LOOMS ARE CROSS CONNECTED.

CAUTION : THE INDEX PINS OF THE TEST SET LOOMS DPX's HAVE BEEN REMOVED TO FACILITATE USE OF LOOM IN DIFFERENT LRU POSITIONS. IT IS IMPERATIVE THAT THE DPX FROM THE TEST SET IS ALIGNED TO THE SAME POLARITY AS THE MATING DPX ON THE AIRCRAFT SIDE. ENSURE THAT THE WORD 'TOP' ON EACH DPX IS ALIGNED TOGETHER AS THE DPX's ARE MATED.

Trouble Shooting :- Use of the Brensel Electronics AFCS Break Out Board Set. P/N TE 6033 Stores Code GEEB0323.



A.F.C.S Breakout Board Set
Figure 101

Conversion Table for the Pitch Computer 41-001-08 from DPX and Test Connector Pins to Switch Functions for Use with AFCS Breakout Board Set, use the Red, Blue, Green, Black & Gold looms.
See Caution Note. P.101.

DPX Ref.	Function	Voltages	Sensing
AA 1	Auxiliary Servo Arm (High)	+28V O/C	+28V=armed
3	Auxiliary Servo Arm to ACC. REC	+25V O/C	+25V=armed
4	Vertical Speed Indicator FW	+28V OV	+28V=healthy
8	IAS Hold Clutch Supply	+28V O/C	+28V=engaged
10	Mach Hold Clutch Supply	+28V O/C	+28V=engaged
11	ALT Hold Clutch Supply	+28V O/C	+28V=engaged
12	VSI Datum Lock Switch	+28V, OV	+28V=engaged
13	Aircraft Power Supply 115V (C)	115V 400Hz Neutral	
15	Chassis Earth	OV	
16	Aircraft Power Supply +28V	+28V	
17	Aircraft Power Supply +28V GND	OV	
19	Instinctive Disconnect	-15V O/C	-15V=disconnect
20	Instinctive Disconnect Supply	-15V	
21	Glide Slope Captured and LOC TRK	+15V -15V	-15V=engaged
22	Barometric Altimeter FW	+28V OV	+28V=healthy
24	Aircraft Power Supply 26V 400HZ (H)	26V 400Hz	
25	Aircraft Power Supply 26V 400Hz (C)	Neutral	
33	Select Altitude Hold	-15V OV	-15V=select
34	Roll Auxiliary Servo Arm (Low)	OV O/C	OV=armed
35	Yaw Auxiliary Servo Arm (Low)	OV O/C	OV=armed
36	Pitch Auxiliary Servo Arm (Low)	OV O/C	OV=armed
37	Roll Relay Jack Centre Lock	+15V -15V	-15V=locked
38	Yaw Relay Jack Centre Lock	+15V -15V	-15V=locked
39	Pitch Relay Jack Centre	+15V -15V	-15V=locked
41	Select Vert Speed Hold	-15V OV	-15V=select
42	Select Mach Hold	-15V OV	-15V=select
43	Select Pitch Hold C	-15V OV	-15V=select
44	Select IAS Hold	-15V OV	-15V=select
45	Radio Altimeter FW C	+28V OV	+28V=healthy
47	Longitudinal Acceleration	analogue	
48	Longitudinal Acceleration	analogue	
50	Spring Strut Micro Switch	+15V -15V	-15V=healthy

DPX Ref.	Function	Voltages	Sensing
51	Logic Power Supply +15V C	+15V	
52	-15V DC Switched C	-15V 0V	
54	Comparator Test A C	0V O/C	0V=test
55	Comparator Test B C	0V O/C	0V=test
56	Comparator Test C C	0V O/C	0V=test
61	Altitude Acquire Primed B	+15V -15V	-15V=primed
66	Altitude Hold Level Switch	+12V -12V	-12V=hold
67	FD1 engaged	+15V -15V	-15V=engaged
68	Other FD engaged	+15V -15V	-15V=engaged
69	Electric Trim 2 Healthy C	+15V -15V	-15V=healthy
70	Other AP in Pitch Hold	+15V -15V	-15V=pitch hold
73	AP in Pitch Hold	+15V -15V	-15V=pitch hold
75	Glide Slope Primed or Glide Slope Captured C	+15V -15V	-15V=active
79	Altitude Acquire Capture B	+15V -15V	-15V=capture
80	Other AP engaged C	+15V -15V	-15V=engaged
81	Other AP Altitude Acquire Capture	+15V -15V	-15V=capture
82	Other AP Glide Slope Capture C	+15V -15V	-15V=capture
83	AP revert to Pitch 1	+15V -15V	-15V=revert
85	Other AP Altitude Hold Level Switch	+12V-12V	-12V<threshold
87	Servo Inhibit B C	+15V -15V	-15V=inhibit
88	Engage Autotrim B C	+15V -15V	-15V=engaged
91	AP in Speed Mode B C	+15V -15V	-15V=speed mode
92	AP engaged B C	+15V -15V	-15V=engaged
93	AP Failure Warning B C	+15V -15V	-15V=healthy
97	Servo Inhibit 2 C	+15V -15V	-15V=inhibit
99	Servo Inhibit 1 C	+15V -15V	-15V=inhibit
100	AFCS Earth C	0V	
102	Flare Test in Progress	+15V -15V	-15V=in progress
104	Flare Test Healthy	+15V -15V	-15V=healthy
105	Glide Slope Capture B C	+15V -15V	-15V=capture
106	Start Programmed Throttle Closure B C	+15V -15V	-15V=start

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DPX Ref.	Function	Voltages	Sensing
AB 1	Pitch hold Illuminate	+28V 0V	+28V=ILL
2	Mach Hold Illuminate	+28V 0V	+28V=ILL
3	IAS Hold Illuminate	+28V 0V	+28V=ILL
6	AP Disconnect from W & LD C	+15V -15V	-15V=disconnect
9	Test Button Illumination	+28V 0V	+28V=test
13	Vert Speed Hold Illuminate	+28V 0V	+28V=ILL
14	MAX OP Illuminate	+28V 0V	+28V=ILL
15	Altitude Hold Illuminate	+28V 0V	+28V=ILL
16	Glide Slope Prime Illuminate	+28V 0V	+28V=ILL
18	Button Illumination Supply	+28V	
26	Altitude Acquire Illuminate	+28V 0V	+28V=ILL
27	Glide Slope Illuminate	+28V 0V	+28V=ILL
28	Altitude Acquire Prime Illuminate	+28V 0V	+28V=ILL
29	AP engage Illumination Supply	+28V	
31	nose Undercarriage Switch C	+15V -15V	-15V=on ground
40	Central Test Facility Q1	+12V -12V	-12V=active
41	Central Test Facility Q2	+12V -12V	-12V=active
42	Central Test Facility Q3	+12V -12V	-12V=active
43	Central Test Facility Q4	+12V -12V	-12V=active
47	Central Test Facility P Address	+12V -12V	-12V=active
48	Central Test Facility Q	+12V -12V	-12V=active
49	Select MAX OP soft	+15V -15V	-15V=select
50	Central Test Facility +12V	+12V	
52	Central Test Facility -12V	-12V	
53	Central Test Facility P1	+12V -12V	-12V=active
54	Central Test Facility P2	+12V -12V	-12V=active
55	Central Test Facility P3	+12V -12V	-12V=active
56	Central Test Facility P4	+12V -9V	-9V = active
65	Outer Boundary Level Switch Cross Synchronising Output	+12V -12V	-12V>threshold
69	Electric Trim 2 healthy M	+15V -15V	-15V=healthy
71	Outer Boundary Level Switch Cross Synchronising Input	+12V -12V	-12V>threshold
75	Glide Slope Primed or Glide Slope Captured M	+15V -15V	-15V=active
80	Other AP engaged M	+15V -15V	-15V=engaged
82	Other AP Glide Slope Capture M	+15V -15V	-15V=capture
87	Servo Inhibit B M	+15V -15V	-15V=inhibit
88	Engage Autotrim B M	+15V -15V	-15V=engage
91	AP in Speed mode B M	+15V -15V	-15V=Speed mode
92	AP Engaged B M	+15V -15V	-15V=engaged

DPX Ref.	Function		Voltages	Sensing
93	AP Failure Warning B	M	+15V -15V	-15V=healthy
97	Servo Inhibit 2	M	+15V -15V	-15V=inhibit
99	Servo Inhibit 1	M	+15V -15V	-15V=inhibit
100	AFCS Earth	M	0V	
105	Glide Slope Capture B	M	+15V -15V	-15V=capture
106	Start Programmed Throttle Closure B	M	+15V -15V	-15V=start

PITCH COMPUTER 41-001

DPX Ref.		Function		Voltages	Sensing
BA	1	Glide Slope Deviation (-)	C	analogue	
	2	Glide Slope Deviation (+)	C	analogue	
	3	AFCS Earth	C	0V	
	4	Radio Altitude (-)	C	analogue	
	5	Radio Altitutde (+)	C	analogue	
	7	Mach Number	C	analogue	
	8	Pitch Attitude (C)	C	synchro	
	10	ADC Failure Warning	C	+28V 0V	+28V=healthy
	11	Vertical Acceleration (-)	C	analogue	
	12	Vertical Acceleration (+)	C	analogue	
	13	600ft Level Switch	C	+15V -15V	-15V >threshold
	16	AP Engage Switch Hold Coil	C	+15V 0V	+15V=hold
	17	RA 100ft Level Switch	C	+12V -12V	-12V<threshold
	18	Select TOD	C	+15V -15V	-15V=select
	21	Approach Below 1500ft Close 16		+15V -15V	-15V =closed
	22	Glide Slope Receiver FW	C	+15V -15V	-15V =healthy
	25	ADI Earth	C	0V	
	26	IAS Hold Error (C)		synchro	
	27	IAS Hold Error (H)		synchro	
	28	Logic Power Supply +15V	C	+15V	
	29	Pitch Rate (-)	C	analogue	
	31	Glide Slope Manual/Auto	C	+15V -15V	-15V=auto
	32	Altitude Hold Error (C)		synchro	
	33	Altitude Hold Error (H)		synchro	
	35	Altitude Select Error Coarse (C)		synchro	
	36	Altitude Select Error Coarse (H)		synchro	
	37	-15V DC	C	-15V	
	38	Pitch Command O/P to ADI		analogue	
	40	Yaw Autostabiliser FW	C	+15V -15V	-15V=healthy
	41	Roll Autostabiliser FW	C	+15V -15V	-15V=healthy
	42	Pitch Autostabiliser FW	C	+15V -15V	-15V=healthy
	43	Go Around Selected	C	+15V -15V	-15V=selected
	45	Azimuth AP Healthy	C	+15V -15V	-15V=healthy
	46	Enter Land Phase	C	+15V -15V	-15V =enter
	47	Land Cancel	C	+15V -15V	-15V=cancel
	48	AP Engage Select	C	+15V -15V	-15V=select
	50	AP Revert to Pitch 2		+15V -15V	-15V=revert
	51	Super $Ø^2$ Output	C	analogue	
	52	Pitch FD Healthy	C	+15V -15V	-15V=healthy
	53	TOD Input	C	analogue	
	56	Barometric Vertical Speed (C)		synchro	

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DPX Ref.	Function	Voltages	Sensing
57	Barometric Vertical Speed (H)	synchro	
59	Roll Attitude C	synchro	
60	Roll Attitude C	synchro	
61	Servo Inhibit A C	+15V -15V	-15V=inhibit
64	Select Altitude Acquire	-15V 0V	-15V=select
65	Pitch Relais Jack Position (H) C	synchro	
66	Pitch Relais Jack Position (C) C	synchro	
67	Pitch Command Bar Removal	+15V 0V	+15V=remove
69	Select MAX OP	-15V 0V	-15V=select
70	Select Glide Slope	-15V 0V	-15V=select
72	Electric Trim 1 Healthy C	+15V -15V	-15V=healthy
74	Own FD Engaged C	+15V -15V	-15V=engaged
75	Select Heading Hold	+15V -15V	-15V=select
76	Altitude Acquire Primed A	+15V -15V	-15V=primed
77	Glide Slope or Land Selec-ted C	+15V -15V	-15V=selected
78	Flare Indicator Output C	+15V -15V	-15V=Flare
79	Altitude Acquire Capture A	+15V -15V	-15V=Capture
80	Mach Hold Error (H)	synchro	
81	Mach Hold Error (C)	synchro	
82	Engage Turb	+15V -15V	-15V=engage
83	Pitch Auxiliary Servo Drive (+)	analogue	
84	Pitch Auxiliary Servo Drive (-)	analogue	
85	Own AP engaged and healthyC	+15V -15V	-15V=engaged
86	Altitude Select Error Fine (C)	synchro	
87	Altitude Select Error Fine (H)	synchro	
88	Engage Autotrim A C	+15V -15V	-15V=engage
90	MAX OP error	analogue	
91	AP in Speed Mode A C	+15V -15V	-15V=Speed mode
92	VSI Speed Error (C)	synchro	
93	VSI Speed Error (H)	synchro	
95	Datum Adjust UP/DOWN	+15V -15V	-15V=DOWN
96	Datum Adjust FAST/SLOW	+15V -15V	-15V=FAST
97	Datum Adjust ON/OFF	+15V -15V	-15V=ON
98	AP Failure Warning A C	+15V -15V	-15V=healthy
102	AP Disconnect from SFC C	+15V -15V	+15V=disconnect
103	Disengage Turbulence	+15V -15V	+15V =disengage
105	Glide Slope Capture A C	+15V -15V	-15V=capture
106	Start Programmed Throttle		

DPX Ref.	Function	Voltages	Sensing
	Closure A C	+15V -15V	-15V=start

PITCH COMPUTER 41-001

DPX Ref.	Function	Voltages	Sensing
BB 1	Glide Slope Deviation (-) M	analogue	
2	Glide Slope Deviation (+) M	analogue	
3	AFCS Earth M	0V	
4	Radio Altitude (-) M	analogue	
5	Radio Altitude (+) M	analogue	
7	Mach Number M	analogue	
8	Pitch Attitude (C) M	synchro	
9	Pitch Attitude (H) M	synchro	
10	ADC Failure Warning M	+28V 0V	+28V=healthy
11	Vertical Acceleration (-)	analogue	
12	Vertical Acceleration (+) M	analogue	
13	600ft Level Switch M	+15V -15V	-15V>threshold
16	AP engage Switch Hold CoilM	-15V 0V	-15V=hold
17	RA 100ft Level Switch M	+12V -12V	-12V+threshold
18	Select TOD M	+15V -15V	-15V=select
22	-15V DC M	-15V	
25	ADI Earth M	0V	
26	Nose Undercarriage Switch M	+15V -15V	-15V=on ground
27	Altitude Alert Visual	+28V 0/C	+28V=warning
28	Logic Power Supply +15V M	+15V	
29	Pitch Rate (-) M	analogue	
32	Glide Slope Receiver FW M	+15V -15V	-15V=healthy
33	Azimuth Computer PSU Ref	-15V	
35	Height Error Offset Fine	synchro	
36	Height Error Offset Fine	synchro	
37	-15V DC Switched M	-15V 0V	
38	Pitch command Output to ADC M	analogue	
39	Altitude Alert Audio Warning	+28V 0V	+28V=warning
40	Yaw Autostabiliser FW M		
41	Roll Autostabiliser FW M		
42	Pitch Autostabiliser FW M	+15V -15V	-15V=healthy
43	Go Around Selected M	+15V -15V	-15V=selected
44	+28V to Altitude Alert	+28V	
45	Azimuth AP Healthy M	+15V -15V	-15V=healthy
46	Enter Land Phase M	+15V -15V	-15V=enter
47	Land Cancel M	+15V -15V	-15V=cancel
48	AP Engage Select M	+15V -15V	-15V=select
49	Select Pitch hold M	-15V 0V	-15V=select
51	Super $Ø^3$ Output M	analogue	
52	Pitch FD Healthy M	+15V -15V	-15V=healthy
53	TOD Input M	analogue	
55	Glide Slope Manual/Auto M	+15V -15V	-15V=auto
59	Roll Attitude M	synchro	

DPX Ref.	Function		Voltages	Sensing
60	Roll Attitude	M	synchro	
61	Servo Inhibit A	M		
65	Pitch Relais Jack			
	Position (H)	M	synchro	
66	Pitch Relais Jack			
	Position (C)	M	synchro	
72	Electric Trim 1 Healthy	M	+15V -15V	-15V= healthy
74	FD Engaged	M	+15V -15V	-15V=engaged
77	Glide Slope or Land	M		
	Selected	M	+15V -15V	-15V=selected
78	Flare indicator Output	M	+15V -15V	-15V=Flare
80	Altitude Alert Switch A		)O/C in quiescentstate	
			)Alternate O/C and S/C when	
81	Altitude Alert Switch B		)Altitude Select Knob	
			rotated	
85	AP Engaged and healthy	M	+15V -15V	-15V=engaged
88	Engage Autotrim A	M	+15V -15V	-15V=engage
89	AP disconnect from W & LD	M	+15V -15V	-15V=healthy
91	AP in Speed Mode A		+15V -15V	
93	AP Failure Warning A	M	+15V -15V	-15V=healthy
96	Altitude Alert Inhibit from			
	U/C switch		-15V O/C	O/C =inhibit
98	Radio Altimeter FW	M	+28V OV	+28V=healthy
102	AP disconnect from SFC	M	+15V -15V	-15V=healthy
105	Glide Slope Capture A	M	+15V -15V	-15V=capture
106	Start Programmed Throttle			
	Closure A	M	+15V -15V	-15V=start

PITCH COMPUTER 41-001

DPX Ref.	Function	Voltages	Sensing
ZA 1	Level Switch 'On Beam' C	+12V 0V	-12V=On Beam
2	Comparator 2 logic output C	+4V 0V	+4V>threshold
3	Comparator 3 logic output C	+4V 0V	+4V>threshold
4	Comparator 4 logic output C	+4V 0V	+4V>threshold
5	Comparator 5 logic output C	+4V 0V	+4V>threshold
7	Comparator 7 logic output	+4V 0V	+4V>threshold
8	Comparator 8 logic output C	+4V 0V	+4V>threshold
9	Comparator 9 logic output C	+4V 0V	+4V>threshold
10	Comparator 10 logic outputC	+4V 0V	+4V>threshold
11	Comparator 11 logic ouput C	+4V 0V	+4V>threshold
12	Ramp Validation Level Switch C	+4V 0V	0V= valid
13	Level Switch 1 0.05g C	+15V -15V	+15V>threshold
14	Level Switch 1500ft C	+4V 0V	+4V>threshold
15	Level Switch Inner Loop Integrator C	+12V -12V	+12V>threshold
16	Level Switch 625ft Height Error C	+12V -12V	+12V>threshold
17	Level Switch Start Flare C	+12V -12V	+12V=start flare
18	Level Switch 0.65 Mach C	+12V -12V	+12V>threshold
19	Sign Sensor q	+12V -12V	)opposite signs
20	Sign Sensor Height Error	+12V -12V	)=capture
21	Glide Slope Capture Pulse C	+12V -12V	+12V=active
22	Inhibit Test For Land C	O/C 0V	0V= inhibit
23	Comparator 10 Cross Comparison Input	analogue	
24	Level Switch 800ft/min	+4V 0V	+4V>threshold
26	MAX OP Error	analogue	
27	Washed Out Longitudinal Acceleration	analogue	
28	Inner Loop feedback gT C	analogue	
29	Filtered Pitch Attitude C	analogue	
30	Compensated Pitch Attitude	analogue	
31	Pitch Attitude Error C	analogue	
32	Washed Out normal Acceleration C	analogue	
33	Complementary Filtered Height Rate	analogue	
34	Altitude Error	analogue	
35	Altitude Acquire Error Rate Demand	analogue	
36	Cruise Modes Rate Demand	analogue	
38	Flare Demand C	analogue	
39	Glide Slope Extension Flare Rate Demand C	analogue	

DPX Ref.	Function		Voltages	Sensing
40	Glide Slope Rate Demand	C	analogue	
41	Outer Loop AP/FD Demands	gD	analogue	
42	Lagged Outer Loop Demand	C	analogue	
43	Outer Loop Integrator	C	analogue	
	Output	C	analogue	
44	Command Modifier Input	C	analogue	
45	Command Modifier Output	C	analogue	
46	AP g error	C	analogue	
47	Inner Loop Integrator	C	analogue	
	Output			
48	Pitch Elevon Demand		analogue	
49	FD Demand (ADI Command			
	Bar	C	analogue	
50	Go Around Error	C	analogue	
51	Filtered Pitch Rate	C	analogue	
52	5kHz Triangular Wave	C	Vpk +4V 0V	
53	F (1/M) Analogue,			
	C8 Cross Comparison	C	analogue	
54	F(M) Mark Space Gain	C	Vpk+15V-15V	
	Adjust			
55	F (1/M) Mark Space Gain			
	Adjust	C	Vpk+15V-15V	
56	Level Switch (synch) 1.2V		+12V -12V	+12V> threshold
57	Level Switch 50ft		+12V -12V	-12V>threshold
58	Remove Ramp	C	+15V -15V	+15V=remove
59	Digital Integrator Output		analogue	
60	Pitch Attitude Offset	C	0V O/C	0V=inhibit
61	S10 Logic Drive	C	+15V -15V	-15V=close
62	S42 Logic Drive	C	+15V -15V	-15V=close
63	S4 Logic Drive		+4V 0V	+4V=close
64	F (1/M) Limited	C	Vpk+15V-15V	
65	S9 Logic Drive	C	+15V -15V	-15V=close
66	S11 Logic Drive	C	+15V -15V	-15V=close
67	S13 Logic Drive	C	+15V -15V	-15V=close
68	S14 Logic Drive	C	+15V -15V	+15V=close
69	S15 Logic Drive		+15V -15V	-15V=close
70	S17 Logic Drive		+15V -15V	+15V=close
71	S18 Logic Drive		+15V -15V	+15V=close
72	S19 Logic Drive		+15V -15V	+15V=close
73	S20 Logic Drive		+4V 0V	0V=close
74	S22 Logic Drive		+15V -15V	-15V=close
75	S33 Logic Drive	C	+15V -15V	-15V=close
76	S37 Logic Drive		+15V -15V	+15V=close
77	S41 Logic Drive	C	+15V -15V	+15V=close
78	S43 Logic Drive	C	+15V -15V	-15V=close
79	S45 Logic Drive		+15V -15V	-15V=close

DPX Ref.	Function		Voltages	Sensing
80	S50 logic Drive	C	+15V -15V	-15V=close
81	S56 Logic Drive	C	+15V -15V	+15V=close
82	Inhibit Inner Loop Integrator	C	O/C -15V	-15V=inhibit
83	Inhibit outer Loop Integrator	C	O/C OV	OV=inhibit
84	Inhibit Normal Acceleration Integrator	C	O/C -15V	-15V=inhibit
85	S6 Logic Drive		+15V -15V	+15V=close
86	S7 Logic Drive		+15V -15V	+15V=close
87	S8 Logic Drive		+15V -15V	-15V=close
88	Start Ramp		+4V OV	OV=start
90	26V 400HZ Power Supply Monitor	C	+4V OV	+4V>threshold
91	Test For Land	C	+4V OV	OV=test

PITCH COMPUTER 41-001

DPX Ref.	Function	Voltages	Sensing
ZB 1	Level Switch 'On Beam' M	+12V -12V	-12V=On Beam
2	Comparator 2 logic output M	+4V 0V	+4V>threshold
3	Comparator 3 logic output M	+4V 0V	+4V>threshold
4	Comparator 4 logic output M		+4V>threshold
5	Comparator 5 logic output M		+4V>threshold
7	Comparator 7 logic output M		+4V>threshold
8	Comparator 8 logic output M		+4V>threshold
9	Comparator 9 logic output M		+4V>threshold
10	Comparator 10logic output M		+4V>threshold
11	Comparator 11logic output M		+4V>threshold
12	Ramp Validation Level Switch M	+4V 0V	0V=valid
13	Level Switch 1 0.05g M	+15V -15V	+15V>threshold
14	Level Switch 1500ft M	+4V 0V	+4V>threshold
15	Level Switch Inner Loop Integrator M	+12V -12V	+12V>threshold
17	Level Switch Start Flare M	+12V -12V	+12V=start flar e
18	Level Switch 0.65Mach M	+12V -12V	+12V>theshold
19	Inhibit Circuit Breaker (TP1)	0/C 0V	0V=inhibit
20	Inhibit PSU monitor (TP2)	0/C 0V	0V=inhibit
21	Glide Slope Capture Pulse M	+12V -12V	+12V=active
22	Inhibit Test For Land M	0/C 0V	0V=iinhibit
23	P1 from Self Test B	+12V -12V	-12V=active
24	P2 from Self Test B	+12V -12V	-12V=active
25	P3 from Self Test B	+12V -12V	-12V=active
26	S46 Logic Drive	+15V -15V	-15V
28	Inner Loop Feedback gT M	analogue	
29	Filtered Pitch Attitude M	analogue	
31	Pitch Attitude Error M	analogue	
32	Washed Out Normal Acceleration M	analogue	
33	Comparator Test A M	0/C 0V	0V=test
34	Comparator Test B M	0/C 0V	0V=test
35	Comparator Test C M	0/C 0V	0V=test
38	Flare Demand M	analogue	
39	Glide Slope Extension/Flare Demand M	analogue	
40	Glide Slope Rate Demand M	analogue	
41	Outer Loop Demand/C5 Cross Comparison	analogue	
42	Lagged Outer Loop Demand M	analogue	
43	Outer Loop Integrator		

DPX Ref.	Function		Voltages	Sensing
	Input		analogue	
44	Command Modifier Input	M	analogue	
45	Command Modifier Output	M	analogue	
46	AP 'g' Error	M	analogue	
48	Switched Pitch Elevon Position		analogue	
49	FD Demand	M	analogue	
50	Go Around Error	M	analogue	
51	Filtered Pitch Rate	M	analogue	
52	5kHz Triangular Waveform	M	Vpk +4V 0V	
53	F (1/M) Analogue/C8 Cross Comparison	M	analogue	
54	F (M) Mark Space Gain Adjust	M	Vpk +15V-15V	
55	F (1/M) Mark Space Gain Adjust	M	Vpk +15V-15V	
56	Inner Loop Integrator Output	M	analogue	
			+12V -12V	-12V>threshold
58	Remove Ramp	M	+15V -15V	+15V=remove
59	Outer loop Integrator Output	M	analogue	
60	Pitch Attitude Offset	M	0/C 0V	0V=inhibit
61	S10 Logic Drive	M	+15V -15V	-15V=close
62	S42 Logic Drive	M	+15V -15V	-15V=close
64	F (1/M) Limited	M	Vpk +15V-15V	
65	S9 Logic Drive	M	+15V -15V	-15V=close
66	S11 Logic Drive	M	+15V -15V	-15V=close
67	S13 Logic Drive	M	+15V -15V	-15V=close
70	S17/S37 Logic Drive		+15V -15V	+15V=close
75	S33 Logic Drive	M	+15V -15V	-15V=close
77	S41 Logic Drive	M	+15V -15V	+15V=close
78	S43 Logic Drive	M	+15V -15V	-15V=close
80	S50 Logic Drive	M	+15V -15V	-15V=close
81	S56 Logic Drive	M	+15V -15V	+15V=close
82	Inhibit Inner Loop Integrator	M	0/C -15V	-15V=inhibit
83	Inhibit Outer Loop	M	0/C 0V	0V=inhibit
84	Inhibit Normal Acceleration Integrator	M	0/C -15V	-15V=inhibit
85	Voltage Detector Output		0V -15V	0V=healthy
86	+15V DC		+15V	
87	+7V DC		+7V	
88	Test Voltage Detector		0/C 0V	0V=test
89	-15V DC		-15V	
90	26V 400Hz PSU Monitor	M	+4V 0V	+4V>threshold

DPX Ref.	Function	Voltages	Sensing
91	Test For Land M	+4V 0V	0V=test

Conversion Table for the Azimuth Computer 40-001-07 from DPX and Test Connector pins to Switch Functions. For use with AFCS Breakout Board Set. Use Red, Blue, Green, Black and Gold looms. See Caution Note P.101.

DPX Ref.	Function	Voltages	Sensing
CA 001	Aircraft 115V C	115V (N)	
002	Aircraft 115V H	115V (L)	
003	Aircraft 28V GND	28V Grnd	
004	Aircraft 28V +	+28V	
006	Other AP Engd	-15V +15V	-15V engaged
007	Servo Inhibit (Other AP)	-15V +15V	-15V inhibited
008	Land P/But	-15V 0V	-15V selected
009	VOR-LOC P/But	-15V 0V	-15V selected
010	HDG Hold P/But	-15V 0V	-15V selected
011	Aircraft 26V C	26V neutral	
012	Aircraft 26V H	26V live	
013	Chassis Earth	Earth	
014	Decrab Inhibit		
016	Glide Captd (Other AP/FD)	-15V +15V	-15V achieved
017	Other FD Engd	-15V +15V	-15V engaged
018	In NAV P/But	-15V 0V	-15V selected
019	HDG TRK P/But	-15V 0V	-15V selected
020	Turb P/But	-15V 0V	-15V selected
021	Back Beam P/But	-15V 0V	-15V selected
022	Glide P/But	-15V 0V	-15V selected
023	TOD selected		
024	TOD I/P Yaw		
025	FD Engd (To other Channel)	-15V +15V	-15V engaged
028	CAPT Conditions (other AP/ FD)	-15V +15V	-15V achieved
029	TRK Conditions (Other AP/	-15V +15V	-15V achieved
030	FD Flag	0V +28V	0V flag
031	Ang Dev Reversion Warn	+28V 0V	0V healthy
032	TH 3 SW	+28V 0V	+28V on
034	BCII Energ and HSI Sens	+28V 0/C	+28V achieved
035	HSI Compass Flag	+28V 0V	+28V flag
037	Capt Conditions	-15V +15V	-15V achieved
038	TRK Conditions	-15V +15V	-15V achieved
042	Cone Arm Conditions (Other AP/FD)	-15V +15V	-15V achieved
043	RA Test Inhibit		
044	ILS Test Inhibit	0/C 0V	0/C inhibited
045	TH 2 SW	+28V 0V	+28Von
046	LOC FREQ selected		
047	U/C SW		
048	VOR RX RW	+28V 0V	+28V healthy
051	Cone Arm Conditions	-15V +15V	-15V achieved

DPX Ref.	Function	Voltages	Sensing
054	Other AT Engd		
055	VOR Test Inhibit		
056	RA Test Inhibit		
057	TH 1 SW	+28V 0V	+28V on
058	TH 4 SW	+28V 0V	+28V on
059	AP Engd (Channel 2 only)	-15V +15V	-15V engaged
060	Glide Captd and LOC TRK	-15V +15V	-15V achieved
061	TOD I/P Roll		
067	600 FT level SW	-15V +15V	-15V 600ft
	PLUG END		

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DPX Ref.	Function	Voltages	Sensing
CB 001	+12V CTF	+12V	
002	-12V CTF	-12V	
003	Test Button Ill		
004	Button Ill Supply		
006	Other AP Engd	-15V +15V	-15V engaged
007	Decrab Inhibit		
008	Land P/But	-15V 0V	-15V selected
009	VOR-LOC P/But	-15V 0V	-15V selected
010	HDG Hold P/But		
011	CTF Gnd	Grnd	
012	CTF O/P ADD	-12V +12V	-12V yes
013	CTF I/P ADD	-12V +12V	-12V yes
014	CTF QI	-12V +12V	-12V active
016	Glide Captd (Other AP/FD)	-15V +15V	-15V achieved
017	Other FD Engd	-15V +15V	-15V engaged
018	GO/Around Ill	28V 0V 400HZ	28V ill
019	GO/Around (ACC record)	0/C -12V	0/C active
020	CTF P 4	0/C -12V	0/C active
021	CTF P 5	0/C -12V	0/C active
022	Glide P/But		
023	TOD selected		
024	TOD I/P Yaw		
025	FD Engd (To other Channel)	-15V +15V	-15V achieved
026	FD FW	-15V +15V	+15V healthy
027	CTF Q 2	-12V +12V	-12V active
028	CTF Q 3	-12V +12V	-12V active
029	TFK Conditions (Other AP/ FD)	-15V +15V	-15V achieved
030	Turb Ill	28V 0V 400 HZ	28V ill
031	VOR-LOC Prime Ill	+28V 0V 400 HZ	28V ill
032	Land (ACC reqrd)		
033	CTF P 3	0/C -12V	0/C active
035	CTF P 2	0/C -12V	0/C active
037	CTF P 6		
038	TRK Conditions	-15V +15V	-15V achieved
040	CTF P 7	0/C -12V	0/C active
041	CTF P 1	0/C -12V	0/C active
043	Land Ill	28V 400HZ 0V	28V ill
044	IN Nav Ill	28V 400HZ 0V	28V 400HZ ill
045	Back Beam Ill	28V 400HZ	28V 400HZ ill

DPX Ref.	Function	Voltages	Sensing
		0V	
047	U/C SW		
050	Turb		
052	CTF Q 4	-12V +12V	-12V active
054	Other AT Engd		
055	HDG Hold Ill	-28V 0V 400HZ	28V ill
056	HDG TRK Ill	28V 0V 400HZ	28V ill
057	VOR-LOC Ill	28V 0V 400HZ	28V ill
058	Land Prime Ill	28V 0V 400HZ	28V ill
059	AP Engd (Channel 2 only)	-15V +15V	-15V engd
060	Glide Captd And LOC TRK	-15V +15V	-15V achieved
061	TOD I/P Roll		
065	CTF Q 5		
067	600 FT level SW		
	PLUG END		

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DPX Ref.	Function	Voltages	Sensing
DA 001	Roll Att H	Synchro	
002	LOC Beam erro +	analogue	
004	AFCS Earth	earth	
005	AFCS earth	earth	
006	Roll Aux Servo Drive +	analogue	
008	LOC Land or Back Beam	-15V +15V	-15V selected
009	Roll Att C	synchro	
010	LOC Beam Error	analogue	
011	CSE H	synchro	
012	Steering SIG H	analogue	
013	Go/Around	-15V +15V	-15V selected
014	Roll Aux Servo Drive	analogue	
015	Roll Command O/P	analogue	
016	Pitch FD Healthy	-15V +15V	-15V healthy
017	LOC RX FW	-15V +15V	-15V healthy
018	Clutched Hdg Erro H	synchro	
019	HDG TRK Error H	synchro	
020	VOR Beam Error +	analogue	
021	CSE C	synchro	
022	Steering SIG C	analogue	
023	Land Cancel	-15V +15V	-15Vland cancel
024	YAW RJ position C	synchro	
025	Yaw AUX Servo Drive	analogue	
027	Mach Number	analogue	
028	HDG Clutch	+28V O/C	+28V engaged
029	Own A/T engd		
030	Clutched HDG error C	synchro	
031	HDG TRK error C	synchro	
032	VOR Beam error	analogue;	
033	Roll RJ position C		
034	Roll RJ position H	synchro	
035	Turb	synchro	
036	Yaw RJ position H	synchro	
037	Yaw AUX Servo drive	analogue	
038	Servo inhibit	-15V +15V	-15V inhibited
039	Own APEngd	-15V +15V	-15V achieved
040	C-CP FW	+28V OV	+28V
041	FD Engd	-15V +15V	-15V engd
042	Enter Land phase	-15V +15V	-15V entered
044	Azim AP healthy	-15V +15V	-15V healthy
045	Bank demand H	analogue	
047	FD FW	-15V +15V	+15V healthy
048	FD Eng SW	-15V +15V	-15V energised
049	FD Yaw O/P +	analogue	
050	RA -	analogue	

DPX Ref.	Function	Voltages	Sensing
051	RA +	analogue	
052	FD Roll O/P +	analogue	
053	Roll Bar removal	analogue	
054	FD Eng SW Hodl coil	+15V O/C	+15V energised
055	Lat ACC SIG	analogue	
056	Glide Captd (Own AP/FD)	-15V +15V	-15V achieved
057	Bank Demand C	analogue	
059	Glide Prime or Captd		
060	HSI FW	+28V 0V	0V healthy
061	Yaw Bar removal		
062	FD Yaw O/P	analogue	
063	No reference		
064	Yaw Rate +	analogue	
065	FD Roll O/P -	analogue	
066	Turn Control position	+4.7V 0V	+4.7V out of detent
067	Turb Cancel	+15V -15V	+15Vturb cancel
	PLUG END		

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DPX Ref.	Function	Voltages	Sensing
DB 001	Roll Att H	synchro	
002	Loc Beam Error +	analogue	
004	AFCS earth	earth	
005	AFCS earth	earth	
006	Pitch AP/FD PSU ref		
009	Roll Att C	synchro	
010	Loc Beam error -	analogue	
011	CSE H	synchro	
012	Azim AP/FD PSU Ref		
013	Go/Around	-15V +15V	-15V selected
016	Pitch FD healthy	-15V +15V	-15V healthy
017	LOC RX FW	-15V +15V	+15V healthy
021	CSE C	synchro	
023	Land Cancel	-15V +15V	-15V achieved
024	Yaw RJ Position C	synchro	
027	Mach Number	analogue	
029	Own AT Engd		
033	Roll RJ position C	synchro	
034	Roll RJ position H	synchro	
036	Yaw RJ position H	synchro	
039	UWN AP Engd	-15V +15V	-15V engaged
040	C-CP FW	+28V 0V	0V healthy
041	FD Engd	-15V +15V	-15V engaged
042	Enter Land Phase	-15V +15V	-15V entered
044	Azim AP Healthy	-15V +15V	-15V healthy
048	FD Eng SW	-15V +15V	-15V engaged
049	FD Yaw O/P +	analogue	
050	RA -	analogue	
051	RA +	analogue	
052	FD Roll O/P +	analogue	
054	FD Eng SW Hold Coil	-15V O/C	
055	Lat ACC SIG	analogue	
056	Glide Captd (Own AP/FD)	-15V +15V	-15V achieved
062	FD Yaw O/P		
064	Yaw Rate +	analogue	
065	FD Roll O/P -	analogue	

AZIMUTH COMPUTER 40-001

DPX Ref.	Function	Voltages	Sensing
DB 001	Roll Att H	synchro	
002	Loc Beam Error +	analogue	
004	AFCS earth	earth	
005	AFCS earth	earth	
006	Pitch AP/FD PSU ref		
009	Roll Att C	synchro	
010	Loc Beam error -	analogue	
011	CSE H	synchro	
012	Azim AP/FD PSU Ref		
013	Go/Around	-15V +15V	-15V selected
016	Pitch FD healthy	-15V +15V	-15V healthy
017	LOC RX FW	-15V +15V	+15V healthy
021	CSE C	synchro	
023	Land Cancel	-15V +15V	-15V achieved
024	Yaw RJ Position C	synchro	
027	Mach Number	analogue	
029	Own AT Engd		
033	Roll RJ position C	synchro	
034	Roll RJ position H	synchro	
036	Yaw RJ position H	synchro	
039	UWN AP Engd	-15V +15V	-15V engaged
040	C-CP FW	+28V OV	OV healthy
041	FD Engd	-15V +15V	-15V engaged
042	Enter Land Phase	-15V +15V	-15V entered
044	Azim AP Healthy	-15V +15V	-15V healthy
048	FD Eng SW	-15V +15V	-15V engaged
049	FD Yaw O/P +	analogue	
050	RA -	analogue	
051	RA +	analogue	
052	FD Roll O/P +	analogue	
054	FD Eng SW Hold Coil	-15V O/C	-15V energised
055	Lat ACC SIG	analogue	
056	Glide Captd (Own AP/FD)	-15V +15V	-15V achieved
062	FD Yaw O/P		
064	Yaw Rate +	analogue	
065	FD Roll O/P -	analogue	

AZIMUTH COMPUTER 40-001

DPX Ref.	Function	Voltages	Sensing
ZA 001	Roll Aux Servo Drive +		
002	Yaw Aux Servo Drive +		
003	FD Roll O/P +		
004	FD Yaw O/P +		
005	CSE SIG		
006	LOC Beam SIG		
007	W/O Roll Att		
008	HDG or In Nav SIG		
009	Roll Integ O/P		
010	Roll Demand		
011	Roll Elevon Demand		
012	Beam Rate	analogue	
013	Engine Failure SIG		
014	Yaw Demand	analogue	
015	Decrab SIG		
016	Rate Limited Roll Demand	analogue	
017	Lagged Roll ATT		
018	VOR beam SIG		
019	Azim AP healthy	-15V +15V	-15V healthy
020	Runway Guidance	-15V +15V	-15V achieved
021	Roll Integ Activation	+15V -15V	+15V activated
022	Cone or VOR flag	+15V -15V	+15V Come/flag
023	C 1		
024	C 3		
025	C 5		
026	C 6		
027	PSU Comp		
028	C 7		
029	C 10		
030	C 12		
031	C 11		
032	C 9		
033	C 2		
034	C 4		
035	VOR-LOC Land or Black Beam selct.	-15V +15V	-15V selected
036	CSE SIG (For VOR-LOC Capt Law)		
038	LOC Error rate modulus		
052	+15V		
053	-15V		
054	AFCS Earth		
055	+12V		
056	-12V		
057	In NAV SIG		

DPX Ref.	Function	Voltages	Sensing
058	C 8		
059	C 13		
060	C 14		
061	C 15		
062	C 16		
063	Engine Failure detection		
064	C 18		
065	5KHZ Drive		
066	Buffered Mach		
067	Buffered RA (Comp)		
068	C 7 I/P		
069	C 8 I/P		
070	2.6V Synchro Ref		
071	C 2 I/P (Monitor)		
072	HDG TRK SIG		
073	Roll Error		
074	Roll RJ SIG		
075	Yaw AP Demand		
076	Roll AP Demand		
077	Cone Arm (And Dev)	-15V +15V	-15V armed
078	Roll Integ Inhibit	-15V +15V	-15V inhibited
079	Decrab		
080	AP IN Standby	+15V -15V	+15V in standby
081	LOC TRK	-15V +15V	-15V achieved
082	VOR-LOC or Land Engd		
083	Runway Guidance SIG		
084	Vor selected	-15V +15V	-15V selected
085	Cone Arm	-15V +15V	-15V armed
086	LOC TRK in Land Mode		
087	Dither		
088	Limited Roll Demand		
089	C 19		

AZIMUTH COMPUTER 40-001

DPX Ref.	Function	Voltages	Sensing
ZB 001	Roll AP Servo Model		
002	Yaw AP Servo Model		
005	CSE SIG		
006	LOC Beam SIG		
007	W/O Roll Att		
010	Roll Demand		
011	Roll Elevon Demand		
012	Beam Rate		
013	Engine Failure SIG		
014	Yaw Demand		
015	Decrab SIG		
016	Rate limited Roll demand		
017	Lagged Roll Att		
019	Azim AP Healthy	-15V +15V	-15V healthy
020	Runway Guidance	-15V +15V	-15V achieved
023	M 1		
024	M 3		
025	M 5		
026	M 6		
028	M 7		
029	M 10		
030	M 12		
031	M 11		
032	M 9		
034	M 4		
054	AFCS earth	0V	
058	M 8		
063	Engine Failure Detection		
064	M 18		
065	5 KHZ Drive		
066	Buffered Mach		
067	Buffered RA (Comp)		
068	M 7 I/P		
069	M 8 I/P		
070	2,6V Synchro Ref		
073	Roll error		
074	Roll RJ SIG		
075	Yaw AP Demand		
076	Roll AP Demand		
079	Decrab		
080	AP in Standby	+15V -15V	+15V achieved
081	LOC TRK	+4.7V 0V	+4.7V achieved
082	LOC or Land Engd	-15V +15V	-15V engaged
083	Runway Guidance SIG		
086	LOC TRK in Land Mode		

DPX Ref.	Function	Voltages	Sensing
088	Limited Roll Demand		
089	M 19		

Warning and Landing Display Computer 51-002-09 or 10
Conversion Table from DPX and Test Connector Pins to Switch Functions

DPX Ref.	Function	Voltages	Sensing
ZA 6	Level switch 1 = level exceeded		
7	Sign sensor. 1 = above beam		
8	Level switches		
10	Go around warning	+5V 0V	+5V warn
11	Oscillator output	-15V +15V	+15V enabled
12	Level switches		
13	M cross sync	0V +15V	0V = logic 1
14	own GS RXFW	0V +28V	+28V healthy
15	own LOC RXFW	0 +28V	0V healthy
16	Double ILS RXFW	0 +28V	0V healthy
17	Level switches		
19	Level switches		
20	Bright dim switches		
21	AP2 (API) engage switch	-15V +15V	-15V engaged
22	OPP GS RXFW	+15V -15V	-15V healthy
23	OPP LOC RXFW	+15V -15V	-15V healthy
28	Bus Bar Split	+15 -15	+15 split
32	C A/P disc	-15V +15V	-15V disconnect
38	C A/T disc	-15V +15V	-15V healthy
51	Capability logic		
52	Capability logic		
53	Autopilot warning logic		
55	Own A/T engage		
60	Own A/P engage selected		

DPX Ref.	Function	Voltages	Sensing
ZB 1	Autocancel pulse	0 +5V	0V = logic 1
7	Level switch 1 = level exceeded		
8	Sign sensor 1 = left beam 0 = right beam		
13	Height switch logic		
14	C cross sync	0V +5V	0V = logic 1
18	M hF level switch		
20	28V less bright		
21	+28V nominal bright		
22	Threshold adjust 1 = level switches		
23	Level switch 1 = level exceeded		
24	Level switch 1 = level exceeded		
27	AP Eng. AP inst. Disc	0 +5	0V operated
32	M A/P disconnect	-15V +15V	-15V disconnect
38	M A/T disc	-15V +15V	
59	-15V SW M		

Warning and Landing Display Computer 51-002
Conversion Table from DPX and Test Connector Pins to Switch Functions

DPX Ref.	Function	Voltages	Sensing
JA 2	ADI OV Switch Unit		
3	AFCS Earth	M	
4	Pitch Command O/P FD	M Analogue	
5	Pitch Command O/P Switch Unit	M Analogue	
7	GS Capture and LOC Track	M +15V,-15V	-15V=TRK
8	OPP Flare Switch	+15V,-15V	-15V=flare
9	INS Cruise Comparison FW	M +15V,-15V	-15V=healthy
10	h<hf after GS Capture and	+15V,-15V	-15V=h<hf
12	Radio Altimeter FW	M +28V,0V	+28V=healthy
14	ADI OV Switch Unit		
18	ADI OV FD		
21	Own GS RX FW	M +28V,0V	+28V=healthy
22	Own LOC RX FW	M +28V,0V	+28V=healthy
23	Roll Command O/P FD	Analogue	
25	Roll Command O/P Switch	Analogue	
26	ADI OV FD		
27	AT Disconnect	M +15V,-15V	+15V=disconnect
28	ADI OV YAW Switch Unit		
34	OPP ADC + PSU FW	+28V, 0V	+28V=healthy
39	Yaw Command O/P Switch Unit	Analogue	
40	ADI OV YAW FD		
42	Radio Altitude (-ve)	Analogue	
48	BITE -12V	-12V	
51	Q Address	+12V,-12V	
54	INS FW	+28V, 0V	+28V=healthy
57	Own GA Select	+15V,-15V	-15V=select
58	hf Switch	M +15V,-15V	+15V=h<hf
59	100 Foot Switch	+15V,-15V	+15V=h<100'
60	P2	-15V, 0V	-15V=active
61	P1	-15V, 0V	-15V=active
62	INS COMP FW (Approach)	M +15V,-15V	-15V=healthy
64	OPP APFD GS Capture	+15V,-15V	-15V=capture
66	OPP AP Cancel	+15V,-15V	-15V=cancel
72	OPP GA Select	+15V,-15V	-15V=select
73	P3	-15V,0V	-15V=active
77	OPP ELP	M +15V,-15V	-15V=ELP
79	AP 2 Engage Switch	+15V,-15V	-15V=engage
80	Q3	+12V,-12V	
81	Q2	+12V,-12V	
82	Q1	+12V,-12V	
84	AP Disconnect	+15V,-15V	+15V=disconnect
86	P4	-15V,0V	-15V=active

DPX Ref.	Function	Voltages	Sensing
87	OPP AT Cancel	+15V,-15V	-15V=cancel
89	OPP LOC RX FW I/P Buffered	M +15V,-15V	-15V=healthy
90	OPP GS RX FW I/P Buffered	M +15V,-15V	-15V=healthy
91	OPP AP FW	+15V,-15V	-15V=healthy
92	OPP AT Engaged	+15V,-15V	-15V=engage
93	OPP AT IAS Select	+15V,-15V	-15V=select
94	OPP GS RX FW Buffered O/P	+15V,-15V	-15V=healthy
95	OPP LOC RX FW Buffered O/P	+15V,-15V	-15V=healthy
96	BITE +12V		
99	P4	-15V,0V	-15V=active
102	Autoland Cancel	+15V,-15V	-15V=cancel
105	OPP FD FW	+15V,-15V	-15V=healthy

WARNING & LANDING DISPLAY COMPUTER 51-002

DPX Ref.	Function	Voltages	Sensing
JB 1	Own AP FW	+15V,-15V	-15V=healthy
2	Chassis Earth		
4	Pitch Command O/P FD	Analogue	
5	Pitch Command O/P Switch Unit	Analogue	
6	Own AT Engage	+15V,-15V	-15V=healthy
7	GS Capture and LOC TRK	+15V,-15V	-15V=TRK
8	Own Flare Switch	+15V,-15V	-15V=flare
9	INS Cruise Comparison FW	+15V,-15V	-15V=healthy
10	INS 3 FW	+28V,0V	+28V=healthy
12	RA FW	+28V,0V	+28V=healthy
13	AP Instinctive Disconnect I/P	+15V,0/C	-15V=disconnect
16	Own FD FW	+15V,-15V	-15V=healthy
17	ADI OV Pitch Switch Unit		
18	ADI OV Pitch FD		
19	Own Autoland Lamp	+28V,0V	+28V=illuminate
20	AP Bar Remove Inhibit Link	+15V,-15V	-15V=inhibit
21	Own GS RX FW	C +28V,0V	+28V=healthy
22	Own LOC RX FW	+28,0V	+28V=healthy
23	Roll Command O/P FD	Analogue	
24	Own Flare Test	+15V,-15V	-15V=test
25	Roll Command O/P Switch	Analogue	
26	ADI OV Roll Unit		
27	AT disconnect	+15V,-15V	+15V=disconnect
28	Own APFD GS Capture	+15V,-15V	-15V=capture
29	Yaw Command O/P FD	Analogue	
30	GS Deviation (-ve)	Analogue	
31	LOC Deviation (-ve)	Analogue	
34	Own ADC + PSU FW	+28V,0V	
36	DH I/P	0V, +7V	0V=DH
38	Audio Warning	+28V,0V	square wave
39	Yaw Command O/P FD	Analogue	
40	ADI OV Yaw		
41	Radio Altitude (-ve)	Analogue	
42	ADI OV Roll Switch Unit		
43	GS DEV (+ve)	Analogue	
44	LOC DEV (+ve)	Analogue	
45	Own AT in IAS Select	+15V,-15V	-15V=select
46	ELP Own	+15V,-15V	-15V=ELP
47	Own Flare Test FW	+15V,-15V	-15V=healthy
48	+15V Supply	C +15V	
49	-15V Supply Switched	C -15V	
51	LOC or Land Select	C -15V,+15V	-15V=select

DPX Ref.	Function	Voltages	Sensing
52	Course Set FW	+15V,-15V	-15V=healthy
53	INS Comparator FW	+28V, 0V	+28V=healthy
54	INS FW	+28V, 0V	+28V=healthy
55	Radio Altitude (+ve)	Analogue	
58	hf Switch	+15V,-15V	+15V=h<hf
59	100Foot Switch	+15V,-15V	+15V=h<100
60	Track Set FW	+15V,-15V	-15V=healthy
62	Approach COMP INS FW	+15V,-15V	-15V=healthy
63	Identification I/P	-15V,+15V	-15V=channel 1
64	ADI OV Yaw		
65	Own Land Mode Illuminate	+15V,0V	+15V=land
66	OPP RA FW	+28V,0V	+28V=healthy
67	AT Engage to ACC REC	+15V,0V	+15V=engage
68	Own APFD ALT ACQ Capture	+15V,-15V	-15V=capture
69	GS or Land Select	+15V,-15V	-15V=select
71	h<hf after GS and LOC TRK	+15V,-15V	-15V=h<hf
72	GA Selected	+15V,-15V	-15V=select
73	AP FW to ACC REC	+15V,0V	+15V=active
74	AT INST DISC	-15V O/C	-15V=disconnect
75	Own AP in Speed Mode	+15V,-15V	-15V=mode
78	Own GA Mode Illuminate	+15V,0V	+15V=GA
80	SPTC	+15V,-15V	-15V=SPTC
81	AP INST DISC to ACC REC	+15V,0V	+15V=active
82	AT INST DISC to ACC REC	+15V,0V	+15V=active
84	AP Instinctive Disconnect	+15V,-15V	-15V=disconnect
86	Go-Around Illuminate	28V 400HZ,0V	28V=GA
87	Land Illuminate	28V 400Hz,0V	28V=LAND
89	OPP LOC RX FW Buffered I/P	+15V,-15V	-15V=healthy
90	OPP GS RX FW Buffered I/P	+15V,-15V	-15V=healthy
93	Own SPTC	+15V,-15V	-15V=SPTC
94	Own GS RX FW Buffered O/P	+15V,-15V	-15V=healthy
95	Own LOC RX FW Buffered O/P	+15V,-15V	-15V=healthy
96	Own Autoland Warning	+15V,0V	+15V=warning
99	Flare Indicator	+28V,0V	+28V=indicator
100	Busbar Interlock	+15V,0V	+15V=healthy

WARNING & LANDING DISPLAY COMPUTER 51-002

DPX Ref.		Function	Voltages	Sensing
HA	1	Oscillator Cross Synchro-	+15V,-15V	square wave
	2	OPP Autoland Lamp O/P	+28V,O/C	+28V=illuminate
	8	+28V dc Normal Supply	+28V	
	9	OPP AT Lamp Output	+28V,O/C	+28V=illuminate
	15	Own W & LD Healthy Output	+28V, OV	+28V=healthy
	16	Own Lamp Test	28V400Hz,O/C	Test=28V 400Hz
	29	Dimming Switch Input	+28V,O/C	+28V=dim
	39	OPP W & LD Healthy Input	+28V,OV	+28V=healthy
	40	OPP Lamp Test	28V400Hz,O/C	Test =28V 400Hz
	48	Oscillqtor Output	+15V,-15V	square wave
	50	Vc Failure WARNING ADC2	+28V,OV	+28V=healthy
	52	OPP GS or Land Select	+15V,-15V	-15V= select
	60	OPP Flare Test	+15V,-15V	-15V=test
	61	OPP Altitude Acquire Capture	+15V,-15V	-15V=test
	63	OPP Flare Test Healthy	+15V,-15V	-15V=healthy
	66	OPP Pilot Test Input	OV,O/C	OV=test
	67	Relais jack Depress Green	O/C,OV	O/C=press
HB	4	+28V Normal Supply		
	5	AFCS Earth		
	8	Own AP Indicator Red	+28V,O/C	+28V=illuminate
	10	Own AT Indicator Red	+28V,O/C	+28V=illuminate
	15	LAND 3 Lamp Output	+28V,O/C	+28V=illuminate
	16	Own Autoland Cancel	+15V,-15V	-15V=cancel
	17	Own AP Cancel	+15V,-15V	-15V=cancel
	19	LAND 2 Lamp Output	+28V,O/C	+28V=illuminate
	20	28V ESSENTIAL EARTH		
	25	DH Indicator O/P	+28V,O/C	+28V=illuminate
	27	Flare Indicator	+28V,O/C	+28V=illuminate
	30	EB CENTRE	+28V,O/C	+28V=illuminate
	31	EB Z+	+28V,O/C	+28V=illuminate
	32	EB Y-	+28V,O/C	+28V=illuminate
	33	EB Y-	+28V,O/C	+28V=illuminate
	41	AP 1 Engage Switch	+15V,-15V	-15V=engage
	42	Own Pilot Test Switch O/P	OV,O/C	OV=test
	43	Own AT Cancel	+15V,-15V	-15V=cancel
	44	EB Z+	+28V,O/C	+28V=illuminate
	46	Outer, Mid Elevons (ELECT	+28V,O/C	O/C=ELECT
	47	Inner Elevons (ELECT MECH)	+28V,O/C	O/C=ELECT
	48	Rudder (ELECT MECH)	+28V,O/C	O/C=ELECT
	55	Aircraft 115V 400Hz (H)		
	56	Aircraft 115V 400Hz (C)		
	60	28V dc Essential EARTH		

ELECTRIC TRIM PITCH COMPUTER 49-004-06

DPX Ref.	Function	Voltages	Sensing
ZA 001	FSS Comp C1		
002	A/Trim Comp C4		
003	Open Loop Comp C2		
004	Inner Loop Comp C5		
005	FU Comp C3		
006	FSS Demod O/P C		
007	FTCM O/P C		
008	D1 O/P		
009	D1 Limit		
010	FU1 Demod O/P		
011	FU2 Demod O/P		
012	Tacho Demod O/P		
013	FTCM Limit		
014	AFCS Earth		
015	Take-Off Trim Monitoring		
016	Mach Number O/P		
017	8.2V 400Hz		
018	Trim Button Test		
021	Trim Button Test		
023	ST Ref C		
024	VC Demod Output		
025	Trim Up		
026	Trim Synch		
027	D1 4.7V		
028	A/Trim Engd		
029	Trim Engd O to M		
030	VC-VMO O/P		
031	FSS Comp I/P O		
032	Sign Det O		
033	Inc Trim Demod O/P		
034	Mach Trim Demod O/P		
036	Trim Down		
037	Sign Det M		

ELECTRIC TRIM PITCH COMPUTER 49-004

DPX Ref.	Function	Voltages	Sensing
ZB 001	FSS Comp M1		
002	A/Trim Comp M4		
003	Open Loop Comp M2		
004	Inner Loop Comp C6		
005	FU Comp M3		
006	FSS Demod O/P M		
007	FTCM O/P M		
009	FSS Comp I/P M		
010	15V		
011	-15V		
012	PS Ref Voltage		
013	FTCM Limit		
014	AFCS Earth		
015	A/Trim Loop Limit		
016	Mach Number Output		
017	8.2V 400Hz		
018	Q1 ST		
019	Q2 ST		
020	Q4 (PS Test)		
021	Q3 ST		
021	Q3 ST		
022	Q5 (D1 Reset)		
023	ST Ref M		
024	VC Demod O/P		
025	Trim Button Test		
026	Trim Synch		
027	Trim Button Tt		
028	A/Trim Engd		
029	Trim Engd M to O		
030	VC-VMO O/P		
031	A/Trim Sig		
033	Inc Trim Demod O/P		
034	Mach Trim Demod O/P		

ELECTRIC TRIM PITCH COMPUTER 49-004

DPX Ref.	Function	Voltages	Sensing
GA 001	Glide Capt Other AP/FD	-15V +15V	-15V Captured
002	Turbulence Other AP	-15V +15V	-15V Turbulence
003	AFCS Earth		
004	Chassis Earth		
005	AFCS Earth		
006	A/Trim Inhibit From Own SFC	-15V +15V	-15V inhibited
007	Trim Clutched to other Channel	-15V +15V	-15V clutched
009	Other AP Engd	-15V +15V	-15V engaged
010	Input Add		
012	Trim Eng SW Hold Coil	0V O/C	0V engaged
013	Trim Down Copilot	-15V O/C	-15V Trim down
014	AFCS Earth		
015	P1		
016	P2		
017	Output Add		
018	+12V CTF		
019	CTF Earth		
020	-12V CTF		
021	Trim Up Copilot	-15V O/C	-15V Trim up
022	Relay Supply from Eng SW		
023	Trim Eng SW	-15V +15V	-15V Trim EngSW
025	-15V to trim switch & EngSW		
026	+15V to Eng Switch		
027	Trim Clutched to Own	-15V +15V	-15V clutched
028	Trim Healthy	-15V +15V	-15V Healthy
029	Own AP Engd	-15V +15V	-15V engaged
030	Q-1		
031	Q-2		
032	Q-3		
033	Q-4		
034	Q-5		
035	8.2V 400Hz		
036	FSS (C)		
037	FSS (H)		
038	Incidence Trim		
039	A/Trim Inhibit From other SFC	-15V +15V	-15V inhibited
040	Mach Trim		
041	8.2V 400Hz		
043	C/O Interlock		
044	Lighting Bar		
045	C/O Input	+15V -15V	+15V C/O input
046	Lighting Bar		
047	C/O Output	+15V -15V	+15V C/O output

DPX Ref.	Function	Voltages	Sensing
048	FU2 (H)		
049	Glide Capt Own AP/FD	-15V +15V	-15V Captured
050	ADC Comp	+28V O/C	+28V ADC Comp
054	ADC FW	+28V O/C	O/C Healthy
055	P3		
056	P4		
057	P5		
060	FU2 (O)		
063	VC		
065	VC-VMO (H)		
066	VC-VMO (O)		
067	Mach Number		

ELECTRIC TRIM PITCH COMPUTER 49-004

DPX Ref.	Function	Voltages	Sensing
GB 001	Glide Capt other AP/FD	-15V +15V	-15VCaptured
002	Trim Healthy	-15V +15V	-15V Healthy
003	AFCS Earth		
004	28V DC		
005	28V DC Earth		
006	A/Trim Inhibit from own SFC	-15V +15V	-15V inhibited
007	Trim Clutched to other Channel	-15V +15V	-15V clutched
008	28V to ACC Rec		
009	Other AP Engd	-15V +15V	-15V engaged
010	Tacho (C)		
011	Tacho (H)		
012	Trim Engd SW Hold Coil	0V O/C	0V Engaged
013	Trim Down Pilot	-15V O/C	-15V trim down
014	AFCS Earth		
015	26V 400HZ (C)		
016	115V 400HZ (C)		
017	Trim Up Pilot	-15V O/C	-15V trim up
019	AFCS Earth		
021	Relay Supply from Eng SW		
022	Lighting Bar		
023	Trim Eng SW	-15V +15V	-15V engaged
024	28V To Clutch		
025	-15V To Trim SW and Eng SW		
026	Own AP Engd	-15V +15V	-15V engaged
027	+15V to Eng SW		
028	26V 400HZ (H)		
029	115V 400HZ (H)		
030	FU1 (O)		
031	FU1 (H)		
032	Trim Clutched to own Channel	-15V +15V	-15V Clutched
033	Lighting Bar		
034	Motor Drive		
036	Turbulence Own AP	-15V +15V	-15V Turbulence
037	8.2V 400HZ		
038	Incidence Trim		
039	A/Trim Inhibit From other SFC	-15V +15V	-15V inhibited
040	Mach Trim		
041	8.2V 400HZ		
043	C/O Interlock		
045	C/O Input	+15V -15V	+15V C/O input
046	Motor Earth		

DPX Ref.	Function	Voltages	Sensing
047	C/O Output	+15V -15V	+15V C/O output
048	FSS (H)		
049	FSS (C)		
051	Clutch Earth		
054	ADC FW	+28V O/C	O/C healthy
055	ADC Comp	+28V O/C	+28V ADC Comp.
056	Glide Capt Own AP/FD	-15V +15V	-15V captured
058	TH1 Max Lim SW	+28V OV	+28V operated
059	TH2 Max Lim SW	+28V OV	+28V operated
060	TH3 Max Lim SW	28V OV	+28V operated
061	TH4 Max Lim SW	28V OV	+28V operated
063	VC		
064	U/C SW		
065	VC-VMO (H)		
066	VC-VMO (C)		
067	Mach Number		

AUTO STABILISER COMPUTER 47-002-07

DPX Ref.	Function	Voltages	Sensing
ZA 001	Yaw Limit		
002	Yaw Sig to Rud Comp		
003	Taw Comp Output		
004	Yaw Axis Healthy		
005	Yaw Axis Rate to Comp		
006	Yaw Axis Rate to AP (H)		
008	Accel Gain		
011	Accel Dem Output		
012	Yaw Rate Gyro Gain		
013	Roll Open Lane output		
014	Roll Comp Output		
015	Roll Axis Healthy		
016	Roll Axis rate to Comp		
017	Roll Axis rate to AP		
020	Pitch Sig to Elv Comp		
023	Roll stick boost		
024	Roll limit		
025	Outer left pitch open lane output.		
026	Pitch Comp Output		
027	Pitch Axis Healthy		
028	Pitch Axis rate to Comp		
029	Pitch Axis rate to AP		
031	Roll Synchro Gain		
036	Yaw Open Lane Output		
038	Roll Gyro Gain		
039	AFCS Earth		
040	Pitch Limit		
041	Pitch Rate Gyro Gain KQ1		
042	Pitch Rate Gyro Gain KQ2		
043	Pitch Gyro (Computing) Demod O/P C		
044	Roll rate Gyro Demod Output		
045	Yaw 26V/400HZ Loss Output		
046	Yaw WHL/Speed Output		
047	Roll WHL/Speed Output		
048	Pitch WHL/Speed Output		
060	Outer Right Roll Open Lane Output		
063	INC Inhibit		
066	Pitch C2 O/P		
072	Pitch Gyro (Monitoring) Demod O/P		
082	Pitch Open Lanes Test Log SIG		

DPX Ref.	Function	Voltages	Sensing
083	Roll Open Lanes Test Log SIG		
084	Yaw Open Lanes Test Log SIG		
086	Pitch Open Lanes Test Analog SIG		
088	Roll Open Lanes Test Analog SIG		
091	Yaw Open Lanes Test Analog SIG		

AUTO STABILISER COMPUTER 47-002-07

DPX Ref.	Function	Voltages	Sensing
ZB 001	Yaw Limit		
002	Inner Left Pitch Open Lane Output		
003	Yaw Comp Output		
004	Yaw Axis Healthy		
005	Yaw Axis rate to Comp		
006	Yaw Axis rate to AP		
008	ACCEL Gain		
011	ACCEL Dem Output		
012	Yaw Rate Gyro Gain		
013	BOT Rud Open Lane Output		
014	Roll Comp Output		
015	Roll Axis Healthy		
016	Roll Axis Rate to Comp		
017	Roll Axis Rate to AP		
020	Mid Right Roll Open Lane Output		
023	Roll Stick Boost		
024	Roll Limit		
025	Inner Right Roll Open Lan5 64TUT		
026	Pitch Comp Output		
027	Pitch Axis Healthy		
028	Pitch Axis rate to Comp		
029	Pitch Axis rate to AP		
031	Roll Synchro Gain		
036	Dither		
038	Roll Rate Gyro Gain		
039	AFCS Earth		
040	Pitch Limit		
041	Pitch Rate Gyro Gain KQ1		
042	Pitch Rate Gyro Gain KQ2		
043	Pitch WHL/Speed Output		
044	Roll Whl/Speed Output		
045	Yaw 26V/400HZ Loss Output		
046	Yaw Whl/speed Output		
047	Roll Rate Gyro Demod Output		
048	Pitch Gyro (Computing) Demod O/P M		
050	-15V Yaw Sup	-15V	
051	+15V Yaw Sup	+15V	
052	-15V Roll Sup	-15V	
053	+15V Roll Sup	+15V	
054	-15V Pitch Sup	-15V	
055	+15V Pitch Sup	+15V	

DPX Ref.	Function	Voltages	Sensing
060	Mid Left Pitch Open Lane Output		
063	INC Inhibit		
066	Pitch M2 O/P		
072	Pitch gyro (Monitoring Demod O/P		
082	Pitch Open Lanes Test Log SIG		
083	Roll Open Lanes Test Log SIG		
084	Open Lanes Test Log SIG		
086	Pitch Open Lanes Test Analog SIG		
088	Roll Open Lanes Test Analog SIG		
091	Yaw Open Lanes Test Analog SIG		

AUTO STABILISER COMPUTER 47-002

DPX Ref.	Function	Voltages	Sensing
EA 001	Roll Rate Gyro (C)	Analogue	
002	Roll Eng SW		
003	Roll FU (C)		
004	C/Unit Yaw Sup +15V	+15V	
005	Lat Accel (H)	Analogue 1.8VMax400HZ	
006	Yaw Axis FW		
007	Yaw Axis FW		
008	Yaw Rate Gyro (C)	Analogue 1.8VMax400HZ	
009	C/Unit Yaw Sup -15V	-15V	
010	Pitch Rate Gyro (Monitoring) (H)	AC signal 400HZ1.8VRMS MAX	
011	Pitch Eng SW		
012	Pitch rate gyro (computint) (C).	AC signal400 HZ 1.8Vr.m.s max.	
013	Roll rate gyro (H)	Analogue1.8V RMS max400HZ	
014	C/Unit Roll Sup -15V	-15V	
015	Roll FU (H)	Analogue 400HZ	
017	Yaw Axis Eng SW Hold Coil		
018	Lat Accel (C)	Analogue	
019	C/Unit Yaw AFCS Earth	Earth	
020	Yaw Rate Gyro (H)	Analogue1.8V Max 400HZ	
021	Yaw Eng SW		
023	Pitch Rate Gyro (Monitoring) (C)	AC Signal 400HZ1.8VRMS Max	
024	C/Unit Pitch Sup -15V	-15V	
025	Pitch Rate Gyro (Computing) (H)	AC Signal 400HZ1.8VRMS Max	
027	Roll Axis Eng SW Hold Coil		
028	C/Unit Sup +15V	+15V	
029	Roll Axis FW		
030	BL Roll Sig	Analogue-10V to +10V	
032	Aircraft DC 28V Gnd	DC Earth	
035	BL Pitch Sig	Analogue-10V	

DPX Ref.	Function	Voltages	Sensing
		to +10V	
036	Pitch Axis FW		
037	C/Unit Sup +15V	+15V	
038	Pitch Axis Eng SW Hold Coil		
040	C/Unit Roll AFCS Earth	Earth	
041	Roll Axis FW		
042	Roll Axis Rate to AP	Analogue-11V to +11V	
044	Yaw Axis FW from other Channel		
045	Yaw Axis Rate to AP	Analogue-12V +12V	
047	Lat ACC to AP (H)	Analogue -7V +7V	
048	Yaw C/O		
050	Pitch Axis Rate to AP	Analogue-9.5	
051	Pitch Axis FW	=15V	
052	C/Unit Pitch Earth	Earth	
053	Axis Rate to Open Lane	Analogue-13V to +13V	
054	AFCS Earth	Earth	
057	Comp Threshold Change	-15V +15V	+15V when SFC controls threshold increase
058	AFCS Earth	Earth	
059	PA2		
061	AFCS Earth	Earth	
062	SFC Healthy		
063	Other AP Eng		
064	VC Higher than 270 Kts		
065	AFCS Earth	Earth	
066	GR Pitch Sig to GR Inner E Sig AMP	Analogue -12.5V+12.5V	
068	Mid Right BL E Sig Amp Test		
069	Mid Right BL E Sig Amp Disc (H)		
070	Mid Right BL E Sig Amp (Disc (C)		
072	Roll C/O		
074	Pitch C/O		
076	Inner Left BL E Sig Amp Disc (C)		
077	Inner Left BL E Sig Amp Disc (H)		

DPX Ref.	Function	Voltages	Sensing
078	Inner Left BL E Sig Amp Test		
079	Inner Left BL E Sig Amp Earth	Earth	
080	Mid Right BL FU (C)	Analogue8.7V 1800HZ	
082	Mid Right BL Servo C/Unit (H)	45mA max current	Trough a Coil external to Computer
083	Mid Right BL E Sig Intl		
084	Mid Right BL AC 1800HZ/26V (H)	26V 1800HZ	
089	Inner Left BL AC 1800HZ/26V (H)	26V 1800HZ	
090	Inner Left BL E Sig Intl		
091	Inner Left BL Servo C/Unit (H)	45mA max current	through a coil external to
093	Inner Left BL FU (C)	Analogue 8.7V 1800HZ	
094	Mid Right BL FU (H)	Analogue 8.7V 1800HZ	
095	Roll Axis O/P from other Channel	Analogue +10V -10V	
096	Mid Right BL Servo C/Unit	45mA max current	Trough coil external to comp
097	Mid Right BL E Sig Intl		
098	Mid Right BL AC 1800HZ/26V (C)		
099	Roll Axis FW from other channel		
101	Pitch Axis FW from other channel		
102	Inner Left BL AC 1800HZ/26V (C)		
103	Inner Left BL E Sig Intl		
104	Inner Left BL Servo C/Unit	45mA max current	through a coil external to
105	Pitch Axis O/P from other channel	Analogue -10 V to +10V	
106	Inner Left B1 FU (H)	Analogue 8.7 V 1800HZ.	

AUTO STABILISER COMPUTER 47-002

DPX Ref.	Function	Voltages	Sensing
EB 001	Roll Rate Gyro (C)	Analogue	
002	Roll Eng SW		
003	Roll FU (C)	Analogue (400HZ)	
004	C/Unit Yaw Sup +15V	+15V	
005	Lat Accel (H)	Analogue 1.8Vmax400HZ	
006	Yaw Axis FW		
007	Yaw Axis FW		
008	Yaw Rate Gyro (C)	Analogue	
009	C/Unit Yaw Sup -15V	-15V	
010	Pitch Rate Gyro (monitoring) (H)	AC Signal 400HZ 1.8V r.m.s. max	
011	Pitch Eng SW		
012	Pitch Rate Gyro (computing) (c)	AC Signal 400HZ 1.8V r.m.s. max	
013	Roll Rate Gyro (H)	Analogue1.8V RMS max400HZ	
014	C/Unit Roll Sup -15V	-15V	
015	Roll FU (H)	Analogue 400HZ	
017	Yaw Axis Eng SW Hold Coil		
018	Lat Accel (C)	Analogue	
019	C/Unit YAW AFCS Earth	Earth	
020	Yaw Rate Gyro (H)	Analogue1.8V RMS Max400HZ	
021	Yaw Eng SW		
023	Pitch rate Gyro (C) (monitoring)		
024	C/Unit Pitch Sup -15V	=15V	
025	Pitch Rate Gyro (Computing) (H)		
027	Roll Axis Eng SW Hold Coil		
028	C/Unit Roll Sup +15V	+15V	
029	Roll Axis FW		
030	Rate Gyro (Monitoring) Whl/speed		
031	Yaw Rate Gyro Test (C)		
033	Lat Accel Test (H)		
036	Pitch Axis FW		
037	C/Unit Pitch Sup +15V	+15V	
038	Pitch Axis Eng SW Hold Coil		
040	C/Unit Roll AFCS Earth	Earth	

DPX Ref.	Function	Voltages	Sensing
041	Roll Axis FW		
042	Roll Axis Rate To AP	Analogue -11V to +11V	
044	Yaw Axis FW from other channel		
045	Yaw Axis Rate To AP	Analogue -12V to +12V	
047	Lat Acc to AP	Analogue -7V to +7V	
048	Yaw C/O		
050	Pitch Axis rate to AP	Analogue -9.5V to +9.5V	
051	Pitch Axis FW		
052	Pitch Gyro (monitoring) Earth	Earth	
053	BL roll sig to BL ELV comp	Analogue -10 to +10V	
054	AFCS earth	Earth	
057	Comp threshold change	+15V -15V	-15Vwhen SFC controls threshold increase.
058	AFCS earth	Earth	
061	AFCS earth	Earth	
062	SFC healthy		
063	Other AP eng		
064	VC higher than 270 KTS		
065	AFCS earth	Earth	
066	Pitch sig to elv comp	Analogue -10V to +10V	
067	Pitch gyro (monitoring) test (H)		
069	Roll rate gyro test (H)		
070	Roll rate gyro WHL/Speed (H)		
072	Roll C/O		
073	Yaw rate gyro test (H)		
074	Pitch C/O		
076	Pitch gyro (computing) Test (H)		
077	Rate gyro (computing) WHL/ Speed		
080	Synchro ref 26V/400HZ (C)	26V 400HZ	
082	Roll rate gyro test & WHL /Speed (C)		

DPX Ref.	Function	Voltages	Sensing
085	Yaw rate gyro WHL/SPEED (H).		
086	Yaw rate gyro test & WHL/ Speed (C).		
088	Yaw rate gyro AC 26V (H)	26V	
091	Pitch gyro (Computing) Earth (C).	Earth	
093	Aircraft AC 115V (H)	115V	
094	Synchro Ref 26V/400HZ (H)	26V 400HZ	
096	Roll Rate gyro AC 26V (H)	26V 400HZ	
097	Roll rate gyro AC 26V (C)		
099	Roll axis FW from other channel.		
100	Yaw rate gyro AC 26V (C).		
101	Pitch Axis FW from other channel.		
103	Pitch rate gyro AC 26V (C)		
104	Pitch rate gyro AC 26V (H)	26V	
106	Aircraft AC 115V (C)		

AUTO STABILISER COMPUTER 47-002

DPX Ref.	Function	Voltages	Sensing
FA 001	+12V CTF	+12V	
002	CTF I/P add roll		
003	CTF Q1		
004	CTF Q2		
005	Panel lighting (C)		
006	Top rud BL E sig intl		
007	Top rud BL E sig intl		
008	Top rud BL E sig amp disc (H)		
009	Top rud BL E sig amp disc (C)		
010	Top rud BL E sig amp test		
011	Top rud BL FU (H)	Analogue (8.7V1800HZ)	
012	Top rud BL FU (C)	Analogue	
013	CTF Earth	Earth	
014	CTF I/P add pitch		
015	CTF Q3		
016	CTF Q4		
017	Panel lighting (H)		
019	Screen pin		
020	Top rud AC 1800HZ/26V (C)		
021	Top rud AC 1800HZ/26V (H)	26V 1800HZ	
022	Top rud BL servo c/unit (C)	Analogue (45mA max).	
025	PA 1		
026	-12V CTF		
027	CTF I/P add yaw		
030	CTF Q5		
031	Yaw adc wiper	Analogue -15V to +15V	
032	Yaw Axis FW		
033	Chassis Earth		
037	Yaw axis output from other channel.		
038	Anti stall engaged		
040	Roll ADC AFCS earth	Earth	
041	Roll ADC sup -15V	-15V	
042	Roll ADC sup +15V & C/O	+15V	
043	Roll axis FW		
045	Yaw ADC sup +15V & C/O	+15V	
046	Yaw ADC AFCS earth		
047	Yaw ADC sup -15V	-15V	
048	ADC capsule FW C		
049	Pitch Axis FW		

DPX Ref.	Function	Voltages	Sensing
050	Pitch ADC sup +15V & C/O	+15V	
051	Pitch ADC sup -15V	-15V	
052	Pitch ADC AFCS earth	Earth	
053	GR roll sig to GR outer E	Analogue -13V to +13V	
055	Roll ADC wiper	Analogue -15V to +15V	
056	Glide captd and loc track		
060	INC	Analogue -15V to +15V	
062	ADC FW C		
064	Pitch ADC wiper	Analogue -15V to +15V	
066	GR pitch sig to GR outer E sig AMP.	Analogue -12.5V	
067	Own AP Eng.		
068	Outer right BL E/sig/Amp test	Analogue -10V to +10V	
069	Outer right BL E sig amp disc (H).		
070	Outer right BL E sig amp disc (C).		
071	Emerg pilot demand roll	Analogue -7V to +7V	
072	Roll axis O/P from other channel.	Analogue -13V to +13V	
073	AFCS earth	Earth	
074	Roll axis output to other channel.	Earth	
075	Antistall/emerg pilot demand pitch.	Analogue -7V to +7V	
076	Outer left BL E sig AMP disc (C).		
077	Outer left BL E sig AMP disc (H)		
078	Outer left BL Esig AMP test (Roll 1/P).	Analogue -10V to +10V	
079	Outer left BL E sig AMP earth	Earth	
080	Outer right BL FU (C)	Analogue 8.7V 1800HZ	
082	Outer right BL servo c/unit (H)	45mA max. current.	Thro ugh coil ext. to Comp.
083	Outer right BL E sig intl		
084	Outer right BL AC 1800HZ/ 26V- (H)	26V 1800HZ	

DPX Ref.	Function	Voltages	Sensing
087	Roll sig to comp (C)		
089	Outer left BL AC 1800HZ/ 26V- (H)	26V 1800HZ	
090	Outer left BL E sig Intl		
091	Outer left BL servo c/unit (H)	45mA current	through coil external to computer
093	Outer left BL FU (C)	Analogue 8.7V 1800HZ	
094	Outer right BL FU (H)	Analogue 8.7V 1800HZ	
		Analogue -10V to +10V	
096	Outer right BL servo c/unit	45mA current	Through coil exte rnal to comp uter.
097	Outer right BL E sig intl		
098	Outer right BL AC 1800HZ/- 26V (C).		
100	Pitch sig to inner ELV com- par (H)	Signal between -13V +13V	
102	Outer left BL AC 1800HZ/26V	Earth	
103	Outer left BL E sig intl		
104	Outer left BL servo c/unit	-45mAcurrent	Through coil external to computer.
105	Pitch axis O/P from other channel.	Analogue -10V to +10V	
106	Outer left BL FU (H)	Analogue 8.7V 1800HZ	

AUTO STABILISER COMPUTER 47-002

DPX Ref.	Function	Voltages	Sensing
FB 001	CTF O/P add roll		
002	CTF P2		
003	CTF P1		
004	Panel lighting (H)		
006	Bot rud BL E sig intl		
007	Bot rud BL E sig intl		
008	Bot rud BL E sig amp disc (H)		
009	Bot rud BL E sig amp disc (C)		
010	Bot rud BL E sig amp test		
011	Bot rud BL FU (H)	Analogue 8.7V 1800HZ	
012	Bot rud BL FU (C)	Analogue	
013	CTF O/P add pitch		
014	CTF P5		
015	CTF P4		
016	CTF P3		
017	Panel lighting (C)		
020	Bot rud BL AC 1800HZ/26V (C)	Earth	
021	Bot rud BL AC 1800HZ/26V (H)	26V 1800HZ	
022	Bot rud BL servo c/unit (C)	Analogue (45mA max)	
023	Bot rud BL servo c/unit (H)	Analogue (45mA max)	
025	PA 1		
026	CTF O/P add yaw		
029	CTF P6		
031	Yaw ADC wiper	Analogue -15V +15V	
032	Yaw axis FW		
037	Yaw axis output form other channel.	Analogue +10V to -10V	
038	Anti stall engaged		
039	GR yaw sig to GR bot E sig AMP.	Analogue -2V to +2V	
040	Roll ADC AFCS earth	Earth	
041	Roll ADC sup -15V	-15V	
042	Roll ADC sup +15V C/O	+15V	
043	Roll axis FW		
045	Yaw ADC sup +15V C/O	+15V	
046	Yaw ADC sup AFCS Earth	Earth	
047	Yaw ADC sup -15V	-15V	

DPX Ref.	Function	Voltages	Sensing
048	ADC capsule FW M		
049	Pitch axis FW		
050	Pitch ADC sup +15V & C/O	+15V	
051	Pitch ADC sup -15V	-15V	
052	Pitch ADC sup AFCS earth	Earth	
053	GR roll sig to GR inner E sig AMP.	Earth	
055	Roll ADC wiper	-15V to +15V	
056	Glide captd and loc trk		
060	INC	Analogue -15V +15V	
062	ADC FW		
064	Pitch ADC wiper		
066	GR Pitch sig to GR mid right E sig.	Analogue -12.5V to +12.5V	
067	Own AP eng		
068	Inner right BL E sig AMP test.		
069	Inner right BL E sig AMP Disc (H)		
070	Inner right BL E sig AMP Disc (C)		
071	Emerg pilot demand roll	Analogue -7V to +7V	
072	Pitch output from other channel.		
074	Pitch sig to other channel	Analogue -13V to +13V	
075	Antistall/emerg pilot demand pitch.	Analogue -7V to +7V	
076	Mid left BL E sig amp disc (C)		
077	Mid left BL E sig AMP disc (H)		
078	Mid left BL E sig AMP test		
079	Mid left BL E sig AMP earth	Earth	
080	Inner right ELV FU (C)	Analogue 8.7V 1800HZ	
082	Inner right BL servo c/unit (H)	45mA current	Through coil external to computer.
083	Inner right BL E sig intl		
084	Inner right BL AC 1800HZ/ 26V (H).	26V 1800HZ	
087	AFCS earth	Earth	

DPX Ref.	Function	Voltages	Sensing
089	Mid left BL sup 1800HZ/26V (H)	26V 1800HZ	
090	Mid left BL E sig AMP intl		
091	Mid left BL servo c/unit (H)	45mA max	Through coil external to computer.
093	Mid elv left BL FU (C)	Analogue	
094	Inner right elv FU (H)	Analogue 8.7V 1800HZ	
095	Roll axis O/P from other channel.	Analogue -10V to +10V	
096	Inner right BL servo c/unit (C)	45mA max current	Through a coil external to computer.
097	Inner right BL E sig intl.		
098	Inner right BL AC 1800HZ/-26V (C).		
099	Yaw sig to other channel	signal -2V to +2V	
100	Yaw sig to rud comp	signal -2V to +2V	
101	Yaw axis output form other channel.	signal -2V to +2V	
102	Mid left BL AC 1800HZ/26V (C).	Earth	
103	Mid left BL E sig intl		
104	Mid left BL servo c/unit (C)	45mA max	Through a coil external to computer.
105	Pitch axis O/P from other channel.		
106	Mid elv left BL FU (H)	Analogue 8.7V 1800HZ	

Item Computer P/N 59-017
Conversion table from DPX and Test connector pins
to switch functions

DPX Ref.	Function	Voltages	Sensing
ZA 1		0V	
2		0V	
3		0V	
4		0V	
5		0V	
6		0V	
7		0V	
22	Test K		
23	Test $\overline{M}$		
28	Test $\overline{N}$		
31	M.sel.		
32	$\overline{\text{ext.interrupt}}$		
85	CTF Q1		
86	CTF Q2		
87	CTF Q3		
88	CTF Q4		
89	CTF Q5		
90	Diagnose	0V O/C	Logic 1=0V
91	Test $\overline{\text{Flag set}}$		

Item Computer P/N 59-017
Conversion table from DPX and Test connector pins
to switch functions

DPX Ref.	Function	Voltages	Sensing
AA 1		115V (H)	
2	Earth	115V C	
3		earth	
4	Cont unit pitch sup.	-15V	
5			
6	Cont unit yaw sup.	-15V	
7			
8	Cont unit roll sup.	-15V	
9			
10	Logic sup VE		
11		earth	
12	Nose U/C Compression SW	-15V +15V	Logic 1=15V
13		+28V	
14		28V earth	
15	Grn Lgc. pitch co.		
16	AP Disc form LD		
17	"alpha" level sw		
25	Spare		
26	Spare		
27	AT DISC from LD.		
28	Test Warning Repeater	+28V0V	Logic 1=28V
29	AP eng. sw select		
30	FD eng. sw select		
31	AS pitch eng. sw off		
32	AS roll eng. sw off		
33	AS yaw eng. sw off		
34	AT eng. sw off		
35	Electric Trim eng.	+15V -15V	
36	API alt ACQ. primed.		
37	Spare		
38	1500 ft. level sw		
39	600 ft. level sw		
40	Coil common C		
41	Supply	28V AC	
42	Spare		
43	Spare		
44	INS FW approach		
45	Spare		
46	Vert speed hold illuminate.		
47	Spare		
48	Alt. acq. illuminate		
49	Glide slope illuminate		
50	Spare		

DPX Ref.	Function	Voltages	Sensing
51	Hdg. trk. illuminate		
52	In nav illuminate		
53	Spare		
54	Land illuminate		
55	Turb. illuminate		
56	Spare		
57	Go around		
58	Spare		
59	Land prime illuminate		
60	Digital data fail warn.		
61	Rad. alt 100ft SW		
62	ADC1 FW		
63	Spare		
64	Compass coupler failure warn.		
65	Altitude fail warn		
66	HSI fail warn		
67	INS FW cruise		
68	SW Disc 1st off		
69	HSI compass flag		
70	HSI fail warn		
71	GSRX FW		
72	Rad alt failure warn		
73	Loc RX failure warn		
74	G/S capture & Loc trk.		
75	API eng sw hold coil		
76	AS pitch fail warn C		
77	AS roll fail warn C		
78	AS yaw fail warn C		
79	API speed mode		
80	FDI eng sw hold coil		
81	ATI eng hold coil		
82	Azim A/P healthy		
83	Pitch FD healthy		
84	Spare		
85	Spare		
86	INS/Rad sw		
87	Relay ADC1 supply		
88	Spare		
89	Turn control in Detent.		
90	Plateform hdg.sw 1/3		
91	Aux att fw 1/3		
92	INS rad HSI compass flag.		
93	SFC healthy C		
94	Self Test 1		
95	ON OFF control unit SFC.	+15V -15V	-15Von

DPX Ref.	Function	Voltages	Sensing
96	Altimeter fail warn		
98	Spare		
100	Spare		
102	AP2 speed mode		
103		-15V	
104	Servo inhibit		
105	Grn. Lgc. yaw Co.		
106	Trim engaged & Clutched		

Item Computer P/N 59-017
Conversion table from DPX and Test connector pins
to switch functions

DPX Ref.	Function	Voltages	Sensing
AB 1	API eng hold coil		
2	AS pitch fail warn M		
3	AS roll fail warn M		
4	AS yaw fail warn M		
5	FD1 eng sw. hold coil		
6	AT1 eng hold coil		
7	Azim AP healthy		
8	Pitch FD healthy		
9	SFC healthy M		
10	Spare		
12	Azimouth AP PSU ref	-15V	
13	Coil common M		
14	Spare		
26	CTF P1		
27	CTF P2		
28	CTF P3		
29	CTF P4		
30	CTF P5		
31	CTF P6		
32	CTF P7		
33	CTF O/P add pitch A/P		
34	CTF O/P add azimuth A/P		
35	CTF O/P add AT		
36	CTF O/P add ET		
37	SQA. spare	-10V + 10V	-10Vlogic 1.
38	CTF Pitch O/P add AS		
39	CTF roll O/P add AS		
40	CTF yaw O/P add AS		
41	Reserved spare AS		
42	CTF I/P add pitch A/P		
43	CTF I/P add azimuth A/P.		
44	CTF I/P add AT		
45	CTF I/P add ET		
46	CTF I/P add LD		
47	CTF roll I/P add AS		
48	CTF pitch I/P add AS		
49	CTF yaw I/P add AS		
50	Reserved spare AS		
51	DC ground	-0V	
52	BITE ITEM	+12V	
53	BITE ITEM	-12V	
54	APFD logic supply	-VE	
55	Pitch logic supply	-15V	

DPX Ref.	Function	Voltages	Sensing
56	Logic supply	+V	
57	APFD logic supply	+VE	
60	Lamp supply	+6V	
61	Logic supply	+5V	
62		-12V	
63		+12V	
64	Lamp supply	0V	
65	Code converter		
66	Code converter		
67	Code converter		
68	Code converter		
69	Decoder		
70	Decoder		
71	Decoder		
72	Decoder		
73	IFM		
74	Bite	+5V-1V	+5V logic 1
75	Test indicator	+5V-1V	+5V logic 1
77	Read		
78	Cancel	+5V-1V	+5V logic 1
79	Read		
81	Flight	+5V-1V	+5V logic 1
82	Spare		
83	Spare		
84	Spare		
85	CTF Q1		
86	CTF Q2		
87	CTF Q3		
88	CTF Q4		
89	CTF Q5		
106	Trim engaged and clutched.		

Pin to function listing of Safety Flight Control
Computer type 49-020-08,-10

DPX Ref.		Function	Voltages	Sensing
ZA	1	Antistall enable	+5V 0V	+5V enable
	2	Stab "alpha">"alpha"	+15V -15V	
	3	To self test trim		
	4	f ("alpha")>"alpha"o LS7	+15V -15V	+15V(logic 1)
	5	Bt sign sense C	+15V -15V	+15V(logic 1)
	6	Emergency control enable	+5V 0V	0V enable
	7	Cross sync		
	8	Incidence warning enable C.	-12V +12V	-12Venable
	10	C2 logic O/P C	0V +5V	0V (logic 1)
	11	STI	-15V +15V	-15V(logic 1)
	12	ST2/4	+12V -12V	+12V(logic 1)
	13	ST3/5	-12V +12V	-12V(logic 1)
	18	C1 logic O/P	0V +5V	0V logic output
	19	Pilot current source pitch.		
	21	Pilot current source roll.		
	26	"alpha">"alpha" AP LS2	+15V -15V	+15V(logic) 1)
	28	VC < 140 kts level sw.		
	35	C2 cross comparison I/P (from command).		
	39	Buffered incidence C		
	43	Copilot current source pitch		
	47	Comparator 1		
	49		-15V	
	50	VC demodulator and washout.		
	52	Incidence warning relay drive.	+5V 0V	+5V energised
	54	Buffered mach. C		
	57		+5V	
	58	Copilot current source roll.		
	59	"beta"t analogue C		
	61	Emergency control pitch demand C		

Pin to function listing of Safety Flight Control
Computer type 49-020

DPX Ref.	Function	Voltages	Sensing
ZB 2	Cross sync. I/P stab		
4	Level switch		
5	"beta" sign sense M.		
8	Incidence warning enable M.		
10	C2 logic O/P M		
24	Exceed pitch attitude positive.	+15V -15V	+15Vexceeded.
25	fM, θ negative		
26	Cross synce I/P A/P		
28	VC<140 knots cross sync.		
35	G2 cross comparison I/P C (from monitor)		
36	Pitch altitude demodulator		
39	Buffered incidence M		
49M	Switched -15V	-15V 0V	-15Vswitched.
52	Incidence warning relay drive M.		
54	Mach buffer		
55	Pulsator monitor	-15V +15V	-15Vhealthy
58	M>1		
59	"beta" t analogue M		

Pin to function listing listing of Safety Flight Control Computer type 49-020

DPX Ref.	Function	Voltages	Sensing
AA		26V RMS 400HZ, O/C	
1c	26V AC 400HZ (H)		
10c	-15V autostabiliser	-15V OV	-15V autostab.
13(c only)	Emergency Control Test pilot.	OV O/C	OV Test
14c	Emergency control lamps.	OV/O/C	OV Lamp
26	"beta"o -"beta"tC Demodulator H	AC analogue 400HZ	
27	"beta"o -"beta"tC Demodula-	11.8V	
28c	tor C Vc<270kts	O/C, -15V	O/C VC<270kts.
29	Pitch rate I/P	DC analogue	
31c	ADC healthy	+28V OV	+28V healthy
32	Vc Demodulator & washout. (C)	AC analogue	
33	Vc Demodulator & washout. (H)	AC analogue	
34c	Pitch autostab healthy.	-15V +15V	-15V healthy
35	Trim 2 inhibit from SFC.		
36	Own incidence warning O/P c		
37	Roll autostab healthy.	-15V +15V	-15V healthy.
38c	Nose wheel undercarriage switch unloaded.	+15V -15V	+15V unloaded
39c	Increase autostab threshold.	-15V +15V	-15V threshold.
40c	Flying control comparator	+28V O/C	+28V inhibited.
41c	ADC cross comparison healthy.	+28V OV	+28V healthy.
42c	Opp incidence warning healthy.	-15V +15V	-15V healthy
43	Mach C		
44c	Anti-stall engage	-15V +15V	-15V engaged.
45	Incidence buffer	DC analogue	
48c	AP disconnect from SFC.	-15V +15V	-15V disconnect
49	Other incidence warning O/P C.		
50c	SFC halthy	-15V +15V	-15V healthy.
51c	Incidence warning healthy.	-15V +15V	-15V healthy.
53	Pilot force sensor pitch.	DC analogue	
54	Pilot force sensor pitch.	DC analogue	
59	Pilot current source pitch.		
61	Pilot current source roll.		
65	Pilot force sensor roll	DC analogue	

DPX Ref.	Function	Voltages	Sensing
66	Pilot force sensor roll	DC analogue	
69c	Other loc track or land track.	-15V +15V	-15V captured
71c	Other A/P engaged	-15V +15V	-15V engaged
75c	Own AP engaged	-15V +15V	-15V engaged
76c	Emergency control engage pilot.	0V O/C	0V engage
77c	Own loc track or land track.	-15V +15V	-15V captured
84	Trim 1 inhibit from SFC		
87c	VC<60kts.	0V O/C	0V (logic 1)
87m			
94	Emergency control roll demand C.	DC analogue ± 11V.	
96	Stick force roll	DC analogue ± 11V	
98	Anti-stall lamp	0V +28V	0V illuminated
102c	Emergency control lamp drive.	+28V	
104	Stick force pitch	DC analogue ± 11V max	
106	SFC Demand Pitch C	DC analogue ± 11V.	

Pin to function listing of Safety Flight Control Computer type 49-020

DPX Ref.	Function	Voltages	Sensing
AB 1m	AFCS 26V AC (H)	26V O/C	
10m	-15V autostabiliser	-15V 0V	-15V autostab
26	"beta"o-"beta"t Demodulator (H)	AC analogue	
27	"beta"o-"beta"t M Demodulator (C)	AC analogue	
28m	V c<270 knots	O/C, -15V	Vc< kts O/C
29	Pitch rate M	DC analogue	
31m	ADC healthy	28V, 0V	28V healthy
32	VcM (c)	AC analogue	
33	VcM (H)	AC analogue	
34m	Pitch autostab healthy	-15V +15V	-15V healthy
35			
36m	Own incidence warning O/P		
37m	Roll autostab healthy	-15V +15V	15V healthy
38m	Nose wheel undercarriage switch unloaded.	+15V -15V	+15V unloaded
39m	Increase autostab threshold	-15V +15V	-15V threshold.
40m	Flying control comparator inhibit.	0V O/C	0V inhibited.
41m	ADC cross comparison healthy.	+28V 0V	+28V healthy
42m	OPP incidence warning healthy	-15V +15V	-15V healthy
43	Mach M		
44m	Anti-stall engage	-15V +15V	-15V engaged.
45m	Incidence	DC analogue	
48m	AP disconnect from SFC	-15V +15V	-15V disconnect
49	Other incidence warning O/P M		
50m	SFC healthy	-15V +15V	-15V healthy.
51m	Incidence warning healthy.	-15V +15V	-15V healthy.
52	Attitude warning		
53	Copilot force sensor pitch.	DC analogue	
54	Copilot force sensor pitch.	DC analogue	
56	INS failure warning		
59	Copilot current source pitch.		
61	Copilot current source roll.		
62	Pitch attitude (H)		
63	Pitch attitude (C)		
65	Copilot force sensor roll	DC analogue	
66	Copilot force sensor roll	DC analogue	

DPX Ref.	Function	Voltages	Sensing
68			
69m	Switched	-15V 0V	-15V switched.
71m	Other A/P engaged	-15V, +15V	-15V engaged.
75m	Own A/P engaged	-15V, +15V	-15V engaged.
76m	Emergency control engage pilot.	0V O/C	0V engaged.
77c	Own LOC track or land track	-15V +15V	-15V engaged
94	Emergency control roll demand M.		
105	Emergency control roll M	DC analogue ±11V.	
106	SFC Demand Pitch M	DC analogue ±11V.	

Autothrottle Computer P/N 42-001-06 conversion table from
DPX and test connector pins to switch functions

DPX Ref.		Function	Voltages	Sensing
ZA	3	Acc. washout lockup	-15V, +15V	-15V logic 1
	5	Eng. Crossover	-4V, -14V	-4V logic 1
	6	Start program throttle closure.	-15V +15V	-15V logic 1
	8	Clutch relay		
	9	Internal regulations	+12V	
	10	Internal regulators	-12V	
	13	Self test 2		
	15	Self test 1	+15V -15V	+15V logic 1
	17	Comparator 1 and servo model.	-0.6V +1V	-0.6V logic 1
	18	Comparator 2 to command engage logic.	-0.6V +4V	-0.6V logic 1
	22	Internal regulator	+4.5V	
	23	Internal derived regulators	+12V	
	24	Internal regulators	+12V	
	27	Self test 6		
	28	Self test 3	+4.5V +0.6V	+4.5V logic 1
	29	ST4	0.6V +4.5V	0.6V logic 1
	31	Self Test + comm		
	33	Speed error level switch.	+15V -15V	+15V logic 1
	34	Washout lockup	-15V +15V	-15V logic 1
	35	Synchrosnise	+15V -15V	+15V logic 1
	37	Motor supply	+VE	
	38	Motor supply	-VE	
	43	Internal regulators supply.	+12V	
	44	Internal regulators supply.	-12V	
	45	Throttle isolation logic.		
	48	Lever rate O/P from comm.		
	49	Synchronizer O/P to FTCM.		
	50	Lever position washout.		
	51	Self test 5		
	52	Flight idle validation.	+15V -15V	+15V logic 1
	53	Self test-comm		
	55	Max thrust indication.	+15V -15V	+15V logic 1
	56	Max thrust validation.	+15V -15V	+15V logic 1
	57	Flight idle indication.	-15V +15V	
	59	Self Test PSU (-) comm.		
	60	Analogue		
	61	Analogue references.	400HZ L 25°	
	63	Analogue references.	400HZ L 35°	

DPX Ref.	Function	Voltages	Sensing
64	Own system sw. driver bias rail.	+1.7V	
67	Bias rail	+5VDC	
68		+7VDC	
71	Accel demod Mon		
72	Lever position washout 21C.		
73	pitch attitude gain change.	-15V, +15V	-15V logic 1
74	Pitch attitude washout.		
76	Zero store		
78	Zero achieved	+0.6V +4.5V	0.6V logic 1
80	Zero store	+4.5 +0.6	+4.5 logic 1
81	Monitor	26V 400HZ	
83	Over ride comparators.	-15V +15V	-15V logic 1
84	Engd to computing	-15V +15V	-15V engd.
85	1AS hold	+15V -15V	+15V logic 1
86	Mach hold	+15V -15V	+15V logic 1
87	1AS acq	+15V -15V	+15Vlogic 1
88	Self Test PSU (+) comm.		
89	Thrust/lever gain adjust.		
90	Ref gain adjust	26V	

Autothrottle Computer P/N 42-001 conversion table from DPX and Test connector pins to switch functions

DPX Ref.	Function	Voltages	Sensing
ZB 5	Engd. crossover	-4V +14V	-4V logic 1
9	Internal regulators	+12V	
10	Internal regulators	-12V	
12	Lever position washout 01B.		
13	Self test 2 mon		
15	Self test 1 mon		
17	Comparator 1 and servo model		
18	Engage logic to mon		
23	Internal regulators	+12V	
24	Internal regulators	-12V	
27	Self test 6 mon		
28	Self test 4 mon		
29	Self test 4 mon		
31	Self test + ve mon		
32	Mach hold	+4.5V to 6V	+4.5V logic 1.
33	Cross synch	+15V -15V	+15V logic 1.
35	Synchronise		
43	Internal regulators	+12V	
44	Internal regulators	-12V	
45	Throttle isolation logic.		
47	Error demand signal from mon.		
48	O/P from monitor FTCM.		
50	Lever position washout.		
51	Self test 5 mon		
52	Flight idle level sw		
53	Self test -ve mon		
55	Max thrust level sw		
60	Analogue 400HZ references.	400HZ L 8°	
61	Analogue 400HZ references.	400HZ L 25°	
63	Analogue references	400HZ L 35°	
71	Accel demod com		
81	Monitor	26V 400HZ	
89	Monitor thrust/-lever gain adjust		
90	Reference gain-adjust.	26V	

Autothrottle Computer P/N 42-001 conversion table from DPX and test connector pins to switch functions

DPX Ref.	Function	Voltages	Sensing
EA 1	IAS acquire lamp		
2	IAS hold lamp		
3	Command	+15VDC	
5	Relay bypass command.	-15VDC	
6	Mach hold lamp		
8c	Pitch attitutde		
9c	Pitch attitude		
11c	IAS hold error		
12c	IAS hold error		
14	Button supply 'H'		
16c	Mach hold error		
17c	Mach hold error		
18c	Hold coil	-15V 0V	-15V hold
19c	AT IN IAS ACQ	-15V +15V	-15V logic 1
20c	AP revert to pitch.	-15V +15V	-15V revert
21c	Turn compensation super Ø2		
22c	Speed discrepancy lamps.		
23c	ADC and PSU Failure warning	+28V 0V	0V healthy
24c	1AS hold clutch	28V 0V	28V clutched
25c	Mach hold clutch	28V 0V	28V clutched
28c	Own AT engage	-15V +15V	=15V engaged
29c	AT disconnect	-15V +15V	-15V disconnect
30	Lever position 1		
31	Lever position 1		
32	Lever position 2		
33	Lever position 2		
34	Lever position 3		
35	Lever position 3		
36	Lever position 4		
37	Lever position 4		
39	Speed selection warning bar		
41	Micro sw supply lever 1		
42c	Channel identity	-15V +15V	-15V logic 1
43	Micro sw supply lever 2		
47c	Own AP engaged	-15V +15V	-15V engaged
48c	Own FD engaged	-15V +15V	-15V engaged
49	Clutch relay supply		
50c	AT 1AS hold select	-15V +15V	-15V hold
51c	AT mach hold select	-15V +15V	-15V selected.
52c	AT 1AS ACQ select	-15V +15V	-15V selected.
53c	Own start prgm. Throttle closure.	-15V +15V	
54c	Own AP/FD speed mode	-15V +15V	-15V engaged

DPX Ref.	Function	Voltages	Sensing
55	Motor drive		
56	Motor drive		
57c	Longitudinal acceleration C		
58c	Longitudinal acceleration H		
59			
60c	Vc-Vrc		
63c	Max cruise	-15V +15V	-15V logic 1
64c & m	Own alt. acq. primed	-15V +15V	-15V logic 1
65	ON/OFF		
67	Datum store up/down		

Autothrottle Computer P/N 42-001 conversion table from DPX and test connector pins to switch functions

DPX Ref.	Function	Voltages	Sensing
FA 1	Power supply 'C'	26V 400HZ	
2	Power supply 'H'	26V 400HZ	
3	Monitor	+15VDC	
4	AFCS earth monitor		
5	Relay bypass monitor	-15V	
8m	Pitch attitude		
9m	Pitch attitude		
11m	IAS hold error		
12m	IAS hold error		
13m	IAS acquire error		
14m	IAS acquire error		
16m	Mach hold error		
17m	Mach hold error		
18m	Hold coil	-15V 0V	-15V hold
20m	AP revert to pitch	-15V +15V	-15V revert
21m	Turn Compensation super Ø²		
22m	Speed discrepancy lamps		
23m	ADC and PSU failure warning	+28V 0V	0V healthy
24m	IAS hold clutch	28V 0V	28V clutched
25m	Mach hold clutch	28V 0V	28V clutched
28m	Own AT engaged	-15V +15V	-15V engaged
29m	AT disconnect	-15V +15V	-15V disconnect
39	Clutch relay supply		
41	Microswitch supply lever 3		
42m	Channel identity	-15V +15V	-15V logic 1
43	Microswitch supply lever 4		
47m	Own AP engaged	-15V +15V	-15V engaged
48m	Own FD engaged	-15V +15V	-15V engaged
50m	AT IAS hold select	-15V +15V	-15V selected
51m	AT mach hold select	-15V +15V	-15V selected
52m	AT IAS ACQ select	-15V +15V	-15V selected
53m	Own start prgm. throttle closure.	-15V +15V	-15V logic 1
55	Self Test 5C		
56	Self Test 5M		
57c	Longitudinal accn. C		
58m	Longitudinal accn. H		
60m	Vc-Vrc		
63m	Max cruise	-15V +15V	-15V achieved.
64c	Max thrust	+15V -15V	+15V achieved.

Autothrottle Computer P/N 42-001 conversion table from DPX and test connector pins to switch functions

DPX Ref.	Function	Voltages	Sensing
FB 2	Power supply	26V 'C'	
3	Earth		
4	Chassis earth	+28V	
5	DC	+28V DC	
6	115V 'N'		
7	115V 'P'		
8	AT clutch supply		
9c & m	Instinctive disconnect switch.	-15V +4V	-15V logic 1
11c & m	Instinctive disconnect		
12	Test lamps		
13c & m	Instinctive disconnect switch	+4V -15V	+4V logic 1
14c & m	Throttle 1 max limit switch	28V 0V	28V logic 1
15c & m	Throttle 2 max limit switch	28V 0V	28V logic 1
16c & m	Throttle 3 max limit switch	28V 0V	28V logic 1
17c & m	Throttle 4 max limit switch	28V 0V	28V logic 1
18c & m	Throttle 1 flight idle idle	28V 0V	28V logic 1
19c & m	Throttle 2 flight idle switch	28V 0V	28V logic 1
20c & m	Throttle 3 flight idle switch	28V 0V	28V logic 1
21c & m	Throttle 4 flight idle switch.	28V 0V	28V logic 1
29	P address		
30	P1		
31	P2		
32	P3		
33	P4		
34	P5		
37	Q1		
38	Q2		
39	Q3		
40	Q address		
41	AT engd & healthy	-15V +15V	-15V engd & healthy.
42	AT clutch supply		
46c	Other AP/FD speed mode	-15V +15V	-15V logic 1
48c	Other start programme throttle closure.	-15V +15V	-15V logic 1
49	Q5		
51m	Other AP/FD speed mode	-15V +15V	-15V logic 1
52m	Other start programme	-15V +15V	-15V logic 1

DPX Ref.	Function	Voltages	Sensing
	throttle closure.		
53	Q4		
56c	AT engd & healthy	-15V +15V	-15V engd & healthy.
57	Bite-12V supply	-12V	
58c & m	other AT engaged C	-15V +15V	-15V engaged
59c	other A/P engaged	-15V +15V	-15V engaged
60c	other FD engaged	-15V +15V	-15V engaged
61c & m	other alt acq primed	-15V +15V	-15V primed
63m	other AP engaged	-15V +15V	-15V engaged
64c & m	other AT engaged M	-15V +15V	-15V engaged
65m	other FD engaged	-15V +15V	-15V engaged
67m	AT IN IAS ACQ	-15V +15V	-15V logic 1

AUTO-FLIGHT - MAINTENANCE PRACTICES -
AUTOLAND CAPABILITY CATEGORISATION

1. General

A. The Elliott-SFENA dual monitored autoland system provides a fail-operation capability into Cat 3 Low Weather Minima.

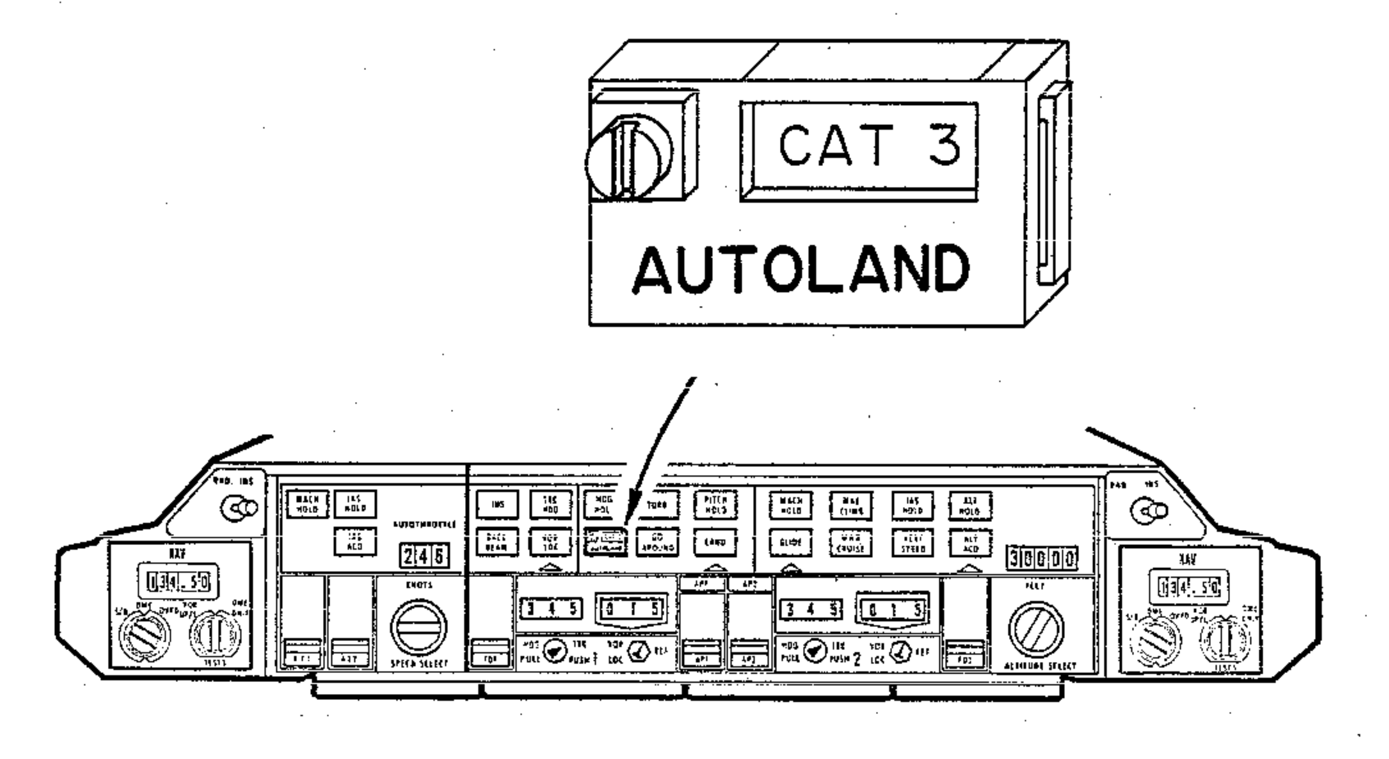
B. Automatic landing is permitted in low visibility conditions as specified in the Flight Manual Limitation section.

C. To obtain maximum utilisation of the Cat 3 capability, the autoland system must be maintained in a fully serviceable condition. Any departure from this will necessitate a regrading procedure.

D. The system is complex and interfaces with many other systems. The criteria must always be when in doubt down-grade.

2. AFCS Placarding

Control of the weather minima operating status of the aircraft is by means of the Low Weather Minima status placard (See Fig. 201).



Low Weather Minima Status Placard
Figure 201

3. Regrading Procedure

A. General

(1) Control of the AFCS placarding is a maintenance function. Regrading and placarding changes can only be made by the responsible maintenance personnel.

(2) The placard is controlled by personnel as a function of:-

(a) Equipment serviceability.

(b) Pilot reports of system performance.

(c) Upgrading/Downgrading procedure (See Flow Chart. Fig. 202).

(3) An aircraft is graded Cat 3 if all the following conditions are met:-

(a) Equipment serviceability does not exceed the allowable deficiencies for Cat 3 defined in the MEL.

(b) The last pilot report of system performance and integrity was satisfactory.

(c) There are no Acceptable Deferred Defects (ADDS) associated with the autoland system.

B. Downgrading Procedure

(1) The aircraft is downgraded by affixing an INOP sticker on the Low Weather Minima placard (See Fig. 201) and raising an ADD with supporting information.

NOTE: Because there are two autpilots, and because only one serviceable system is required for Cat 2 capability, it will rarely be necessary to down-grade below Cat 2. However, in the event that both systems have integrity or equipment deficiencies or there is a performance fault which cannot be attributed to a particular auto-pilot before or at touchdown, then the autoland system will be downgraded to Cat 1 by use of INOP label on Cat 2 placard with or without autoland operative as applicable (specify in ADD).

(2) The aircraft must be downgraded for any of the

following:-

(a) Pilot requested downgrading.
If the pilot considers the performance of the system to be unsatisfactory, then the pilot is responsible for requesting that the placard status be changed as appropriate. This request can only be made by an entry in the Tech. Log.

(b) Engineering requested downgrading.
If, through Flight Data Recording or other data, the specialist System Engineer detects that the system performance or integrity is not satisfactory then the Specialist Engineer will raise an "All Weather Operations Reinstatement Form-X6062" (Fig. 204) for the responsible maintenance personnel to action as appropriate.

(c) Autoland integrity downgrading.
Any Tech Log reports or ground check faults to AFCS warning must result in the appropriate downgrading. (See Fig. 202).

(d) Equipment unserviceability downgrading.
If any AFCS equipment or associated systems' equipment used for automatic landing is unserviceable, then the placard status must be changed as appropriate and an ADD raised with details of the unserviceability. Once the deficiency is cleared, the system may be placarded Cat 3.

The placard status for equipment unserviceability should be determined from the MEL. Section 5, Vol 2A of the Flying Manual.

C. Upgrading Procedures

(1) The aircraft is upgraded by changing the status placard (Fig. 201) and clearing any associated ADDs.

(2) Upgrading may only be carried out by the responsible maintenance personnel.

(3) Upgrading procedure must be accomplished in accordance with the Cat 3 Regrading Flow Chart. (Fig. 202).

In general, upgrading occurs by one or more of the following actions:-

(a) Positive identification and rectification of the defect causing the downgrading.

(b) A Ramp Down Check (See Page 209).

(c) Satisfactory further report(s) (See Fig. 203).

(d) Complying with action of an AWO Reinstatement Form X6062 (See Fig. 204) or Maintenance Control Engineering ADD 98**.

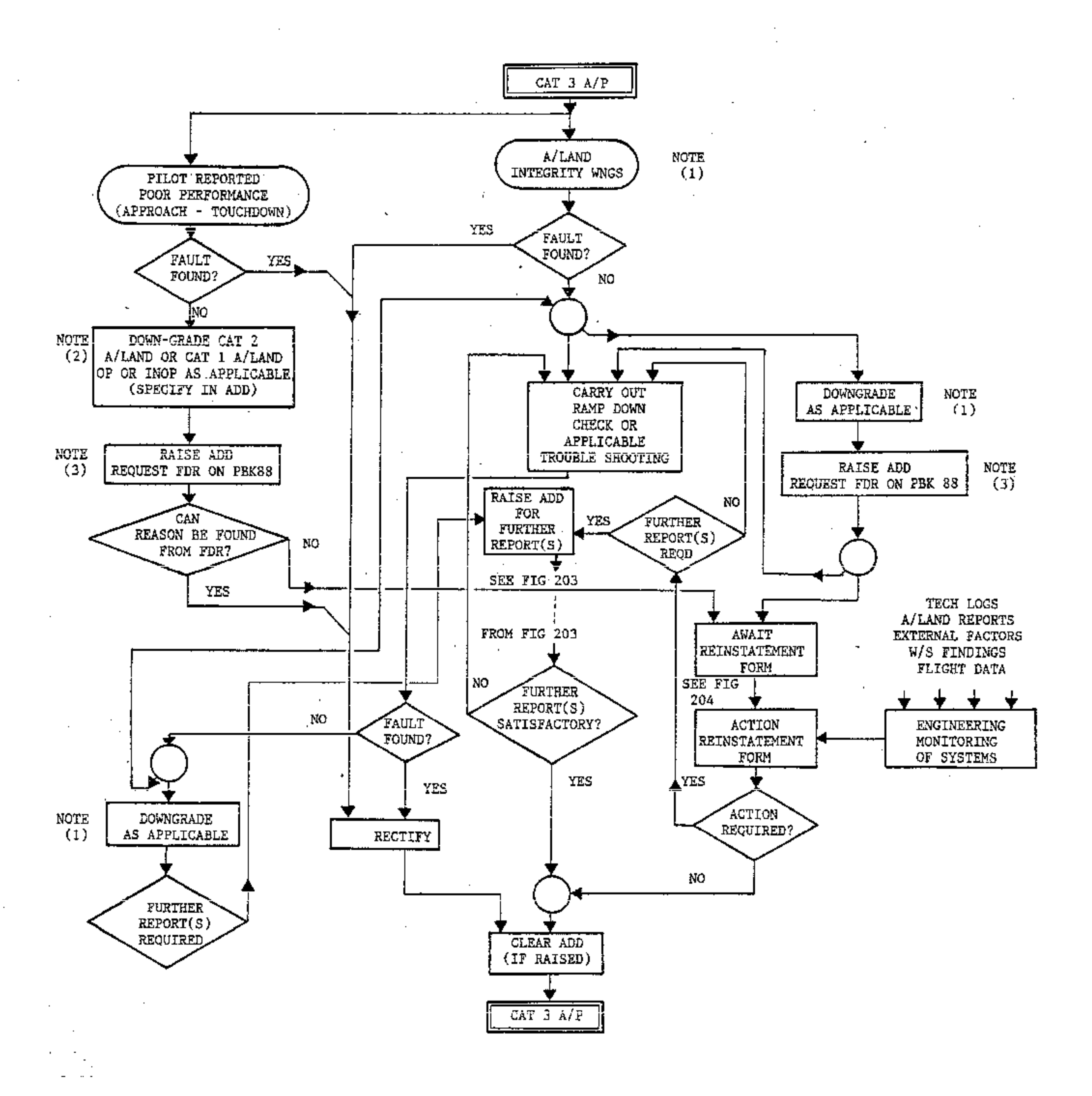
NOTES: (1) Positive identification and rectification of a defect enables a system to be reverted to full status immediately.

(2) A Ramp Down check will normally only check the integrity of the system (Warnings, etc). Only those performance faults able to be associated with a particular check in the Ramp Down Check can be considered for upgrading. For example, poor flare manoeuvre, poor localiser holding, etc will not normally be cleared by accomplishing a Ramp Down check. Such defects will normally require AIDS analysis and/or a STANDARD APPROACH/LANDING.

(3) A STANDARD APPROACH is an approach achieved with both autopilots engaged throughout the approach down to a minimum, of 500 ft (RA) with no autopilot warnings and no adverse pilot comment on the performance of the system. It is necessary for the pilot to state "Satisfactory Standard Approach Carried Out" or similar statement in the Tech Log.

(4) A STANDARD LANDING is an automatic landing achieved with both autopilots engaged throughout approach and landing with no autopilot warnings and no adverse pilot comment on the performance of the system. It is necessary for the pilot to state "Satisfactory Standard Landing Carried Out" or similar statement in the Tech Log.

(5) The AWO Reinstatement Form is issued by Technical Services Branch. The reference number should be inserted in the Tech Log action block against the associated defect.



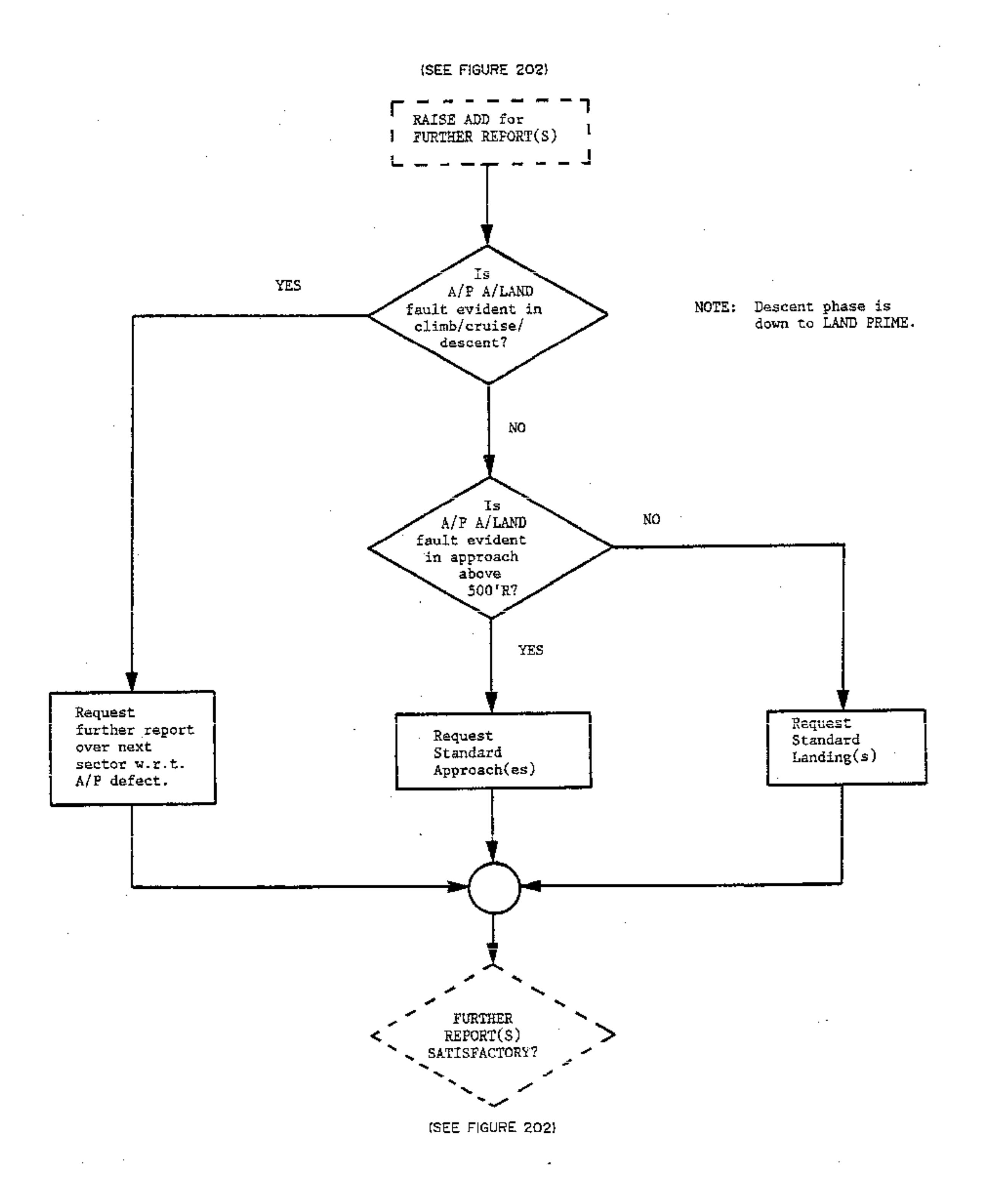
Cat 3 Regrading Flow Chart
Figure 202

NOTE 1. LAND 2 capability on W & LD indications . . . . CAT 2
An autopilot auto-disconnect in LAND mode . . . . CAT 2
A total autopilot auto-disconnect in LAND mode . . . CAT 1 autoland.
(Place INOP sticker over 'CAT 2' window on Low Weather Minima Status placard and state "CAT 1 Autoland only" in associated ADD).
An AUTOLAND warning . . . . CAT 1 autoland inoperative (INOP sticker and ADD entry).

2. Poor localiser, glideslope or speed holding or poor flare can be attributed to the A/P in control - No. 1 if both A/P's engaged. Thus the other autopilot is unaffected and can provide a CAT 2 capability, the defective A/P will be specified in the ADD. If it cannot be determined which A/P was engaged then the CAT 1 category applies. i.e. INOP sticker over CAT 2 Low Weather Minima status placard.
ILS DEVIATION warning below 500'R . . . . CAT 2

3. Flight Data Recording (FDR)
Playback requests can be made using DISC "ATM PBK 88" based on Tech Log entry. ATM PBK 88 is monitored by Engineering and FDR analysis is detailed on an AWO Reinstatement Form. If required FDR can also be requested for the fleet supervisor for his own analysis via the ATM PPK 88 entry.

The ATM PBK 88 entry should be cleared when the ADD is either cleared or re-raised.



Standard Approach/Landing Flow Chart
Figure 203



Issued by Technical Services Branch, TBA, S366.

To:

Service Engineering, Queens Building, LHRC, N123
Technical Control 1 / 2 / 3 / 4 / 5 / 6 *
T.B.A. North / South / East / West *
T.B.B. East / West *
T.B.K.*
T.B.J.*

Date: ....

"MSG SVA DEF ...."

"All Weather Operations Reinstatement Form Ref No. .... "

"A/C Type .... Reg .... Serv. Nr. .... Date .... ADD Nr. .... "

"1" Reported problem:–

" .... "

"2" Relevant Flight Data:–

"(a)"	is not available	....
"(b)"	has been analysed	....
"(c)"	is not applicable	....

"3" The reported problem is:–

"(a)"	not confirmed	....
"(b)"	an aircraft defect	....
"(c)"	induced by external influences	....
"(d)"	other (please specify below)	....

"4" Information or action as appropriate:–

" ....

....

....

....

....

....

....

.... "

"5" It is recommended that, provided there are no other Autoland related defects the relevant Autoland status be regraded .... as follows:–

"(a)"	without delay (no work required)	....
"(b)"	after Actions in "4" completed	....
"(c)"	upon satisfactory completion of an Autoland/ARC* Reinstatement/Ramp down* check	....
"(d)"	after one/two/three* successful Standard Landings	....
"(e)"	upon satisfactory completion of BITE test	....

**Delete as applicable*

"......" indicates DISC entry format under MSG. "Authority.."

X.6062 (1st)

AWO Reinstatement Form
Figure 204

PRINTED IN ENGLAND

RAMP DOWN CHECK

1. A. General

(1) To achieve the LAND mode simulations, the following procedures are detailed assuming the aircraft is in a configuration where normal autopilot engagement in basic modes is possible. That is, electrical power, ground hydraulic pumps, autostabiliser systems, electric trim systems etc., are all able to be switched on or engaged as necessary.

B. Test Equipment

(1) CRM588 or 2 off CRM555's ILS Tx test sets or equivalent. Select ILS frequency on test set and Nav Controller (108.1 for CRM588).
Ensure battery levels are in the green band or power test set by aircraft 28V d.c. power.

(2) Switch on and check LOC and GS flags clear.

(3) TRT Radio Altimeter test set AHV5-018.
connect to front test sockets of both Radio Altimeter T/R's.

(4) Set to appropriate height of 1000 ft RA.
Check Rad. Alt. flags are clear.

C. Preparation for Test

(1) Trip LDG DISPLAY SYS 1 and LDG DISPLAY SYS 2.

(2) If either W & LD Computer is not to suffix "BA" standard,link ZA1 and ZA28 on W & LD Computer front test socket to simulate bus bar split.

(3) Re-set LDG DISPLAY SYSTEM 1 and 2 CB's.

(4) Select NORM on both ADC controllers.

(5) Ensure all INS's in NAV mode.

(6) Select all surfaces into electrical signalling.

(7) All u/c wt. sw. CB's may be left set.
(Trim has to be maintained in the green band for the 'ground' condition).

D. Troubleshooting Tests (Refer to MM 22-10-00 page 573 for full check of LAND mode).

(1) Engage at least one Autothrottle in IAS ACQ.

(2) Engage both FD's.

(3) Offset localiser and glideslope deviations if required, to simulate capture of ILS.

(4) Select LAND mode. Check LOC, GLIDE & LAND primes illuminate. Reduce Localiser and glideslope signals to zero and check LOC & GLIDE captures. check that LAND mode illuminates (20 seconds after LOC capture).

(5) Check excess deviation light operation, if required, by using ILS test set.

(6) Ensure localiser and glideslope deviations are zero.

(7) Engage AP1 and continually control trim within green band using glideslope signal.

(8) Check that there is LAND 2 capability indicated on W & LD Indicator.

(9) Engage AP2. check that there is LAND 3 capability.

(10) LAND capability is generated by:-

(a) At least one AT in IAS ACQ.

(b) At least one FD engaged.

(c) The 3 INS's in NAV mode and Inertial Comparator healthy.

(d) Elevons in electrical mode.

(e) Bus-bars split (W & LD link ZA1 - ZA28).

(f) Course set within 4° of each system below 600 ft RA only. (Synchronise compasses).

(11) Check Autochangeover operation at this stage as necessary injecting localiser and/or glideslope to check synchronisation.

(12) Slowly reduce radio height to zero.

(13) At a height less than 300 ft the LAND 3 capability is latched. Disconnect of an AP will check this.

Re-engage AP.

(14) Below 200ft RA the AUTOLAND light will illuminate with excess localiser deviation, for example.

(15) Check Flare Initiate at between 50ft RA and 35ft RA by observing activity on control column and throttle closure at 15ft RA (Note that some of these functions can be seen with FD's only if the control activity is too high with A/P engagement. Re-engage A/P's into LAND mode after check).

(16) Push at least two throttle levers to max thrust to check GO-AROUND.

(17) The LAND mode will go out, the A/T's will disconnect and the GO-AROUND light illuminates.

(18) Select HDG HOLD to revert to basic modes and A/P2 will disconnect.

GENERAL - SERVICING

WARNING : BEFORE PROCEEDING WITH MAINTENANCE WORK ON OR NEAR MECHANICAL FLIGHT CONTROLS OR PRIMARY FLIGHT CONTROL SURFACES, LANDING GEARS, ASSOCIATED DOORS OR ANY MOVING COMPONENT, MAKE CERTAIN THAT GROUND SAFETIES AND/OR WARNING NOTICES ARE IN CORRECT POSITION TO PREVENT INADVERTENT OPERATION OF CONTROLS.

BEFORE POWER IS SUPPLIED TO THE AIRCRAFT MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

WHEN EQUIPMENT IN RACKS AND/OR FLIGHT COMPARTMENT INSTRUMENTS ARE SUPPLIED WITH POWER FROM THE GROUND POWER UNIT, THE AVIONICS COMPARTMENT COOLING SYSTEM AND APPROPRIATE VENTILATION SYSTEMS MUST BE IN OPERATION.
THE GROUND DEPRESSURIZATION VALVE MUST BE OPEN. FURTHERMORE, IF AMBIENT TEMPERATURE IS ABOVE 30°C IN THE FLIGHT COMPARTMENT, THE GROUND AIR PRECONDITIONING SYSTEM MUST BE IN OPERATION.

END OF THIS SECTION

NEXT

AUTOPILOT - DESCRIPTION AND OPERATION

1. General

A. The purpose of the Autopilot and Flight Director (AP/FD) System is to provide automatic control of the aircraft during cruise, approach and automatic landing configurations. The Autopilot (AP) function provides automatic control via the aircraft flight control system. The Flight Director (FD) provides control demands which are displayed on the Attitude Director Indicator (ADI) and when satisfied cause the aircraft to attain the desired flight path.

B. The AP system comprises two separate monitored channels operating into the Pitch, Roll and Yaw Relay Jacks. Operation with only one channel is possible, but if a fail operative capability is required, then the engagement of both channels is necessary. With both channels engaged, the second channel operates in a synchronizing mode, ready to assume control should the first channel fail. In cruise, only single channel operation is possible.

The FD system comprises two separate monitored channels utilizing the same analog and logic computation as that associated with the AP function, providing commands to either ADI.

Engagement of either the AP or FD is controlled by separate solenoid held engage switches, with a separate switch for
R each channel. Integrally lit push-buttons provide the common mode selection for both AP and FD channels, with simultaneous operation of the logic mode illumination in both channels when only one AP or FD channel is engaged. These controls are located on the glareshield mounted AFCS Control Unit.

The analog and logic computation associated with each AP/FD channel is housed in two separate units, one computer for the pitch functions and one for the azimuth functions, there being a large measure of integration between the units in respect of mode and engagement logic. Additional logic computation primarily associated with the approach and landing configurations is contained within the associated Warning and Landing Display computer for each channel.

The Integrated Test and Maintenance System (ITEM) provides information to assist in location of faults occurring within the AP/FD system, ITEM having two modes of operation, IFM (In Flight Monitoring) and Test (used on the

R ground). The ITEM system operation is further defined in
R 22-42-00, Description and Operation.

2. AP/FD Components
(Ref. Fig. 001)

A. The main AP/FD system components are the following :

(1) An AFCS control unit (C1)

(2) An AFCS datum adjust unit (C2)

(3) Two pitch computers (1C12 and 2C12).

(4) Two azimuth computers (1C13 and 2C13).

(5) Three relay jack sensors (C3, C4, and C5).

(6) Three duplicate microswitches (C7, C9, and C11), mounted on AP force limiters. These microswitches are dealt with in 22-11-00, Description and Operation, paragraph 7.

(7) Two duplicate push-buttons (1C14, 2C14, 1C15, and 2C15), for AP instinctive disconnection. They are located on Captain and First Officer control column handwheels. They are dealt with in 22-11-00, Description and Operation, paragraph 6.

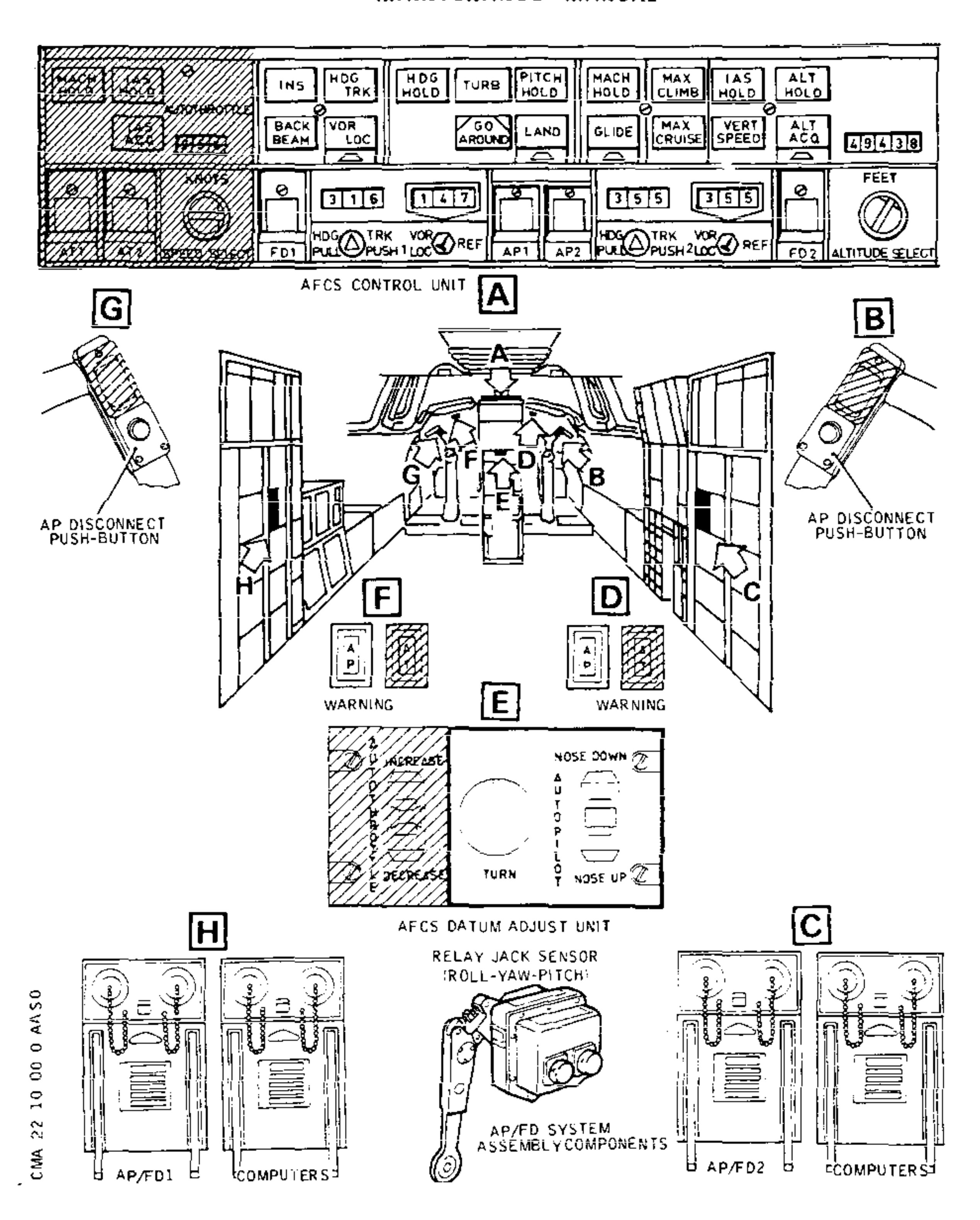
The three relay jacks associated with the AP system are dealt with in the Flight Controls Chapter.

ROLL RELAY JACK Ref. 27-14-00, Description and Operation.
YAW RELAY JACK Ref. 27-24-00, Description and Operation.
PITCH RELAY JACK Ref. 27-34-00, Description and Operation.

The two attitude director indicators, which are associated with the FD system are dealt with in 34-23-00, Description and Operation.

B. AFCS Control Unit

(1) The AFCS control unit is mounted on the glareshield, above the centre instrument panel, half-way between the Captain's and First Officer's stations. On the AP/FD section lower part are located the two AP engage switches, the two FD engage switches and on the upper part, the mode selection push buttons. It also includes the ALTITUDE SELECT, track or heading and VOR radial switches. The AFCS control unit is dealt with in 22-11-00, Description and Operation, paragraph 2.



- AP/FD System Components
Figure 001

C. AFCS Datum Adjust Unit

(1) This unit is mounted on the centre console, forward of the throttle control levers.

The AP/FD section includes two control switches :

One NOSE UP/NOSE DOWN toggle switch associated with the pitch AP/FD, and one TURN knob associated with the azimuth AP/FD.
This unit is dealt with in 22-11-00, Description and Operation, paragraph 3.

D. Pitch Computers

(1) They are mounted on electronics rack shelves. Computer No.1 is located on shelf 4-215. Computer No.2 is located on shelf 4-216. Their interlock circuits are dealt with in 22-11-00, Description and Operation ; the circuits specific to the channel in 22-12-00, Description and Operation, paragraph 3.

E. Azimuth Computers

(1) They are mounted on electronics rack shelves.
Computer No.1 is located on shelf 4-215.
Computer No.2 is located on shelf 4-216.
Their interlock circuits are dealt with in 22-11-00, Description and Operation ; the circuits specific to the channel in 22-13-00, Description and Operation, paragraph 3.

F. Relay Jack Sensors (RJS)

(1) These three separate units are mounted on the relay jack (RJ) chassis and their input levers are driven by the associated relay jack.
These units are described with the associated channel (pitch or azimuth). (PITCH RJS, Ref. 22-12-00, Description and Operation, paragraph 4 - ROLL RJS and YAW RJS, Ref. 22-13-00, Description and Operation, paragraph 4.

3. Systems Signal Interface and Power Distribution
(Ref. Fig. 002)

A. Various data sources provide the main reference data required for the aircraft flight control through the AP/FD system.

B (1) The Inertial Navigation System (A/C Delco)

(2) The Air Data System (Crouzet)

(3) The Compass Coupler (Sperry)

(4) The Horizon Situation Indicator (Sfena)

(5) The Track Heading Unit (Sfena)

(6) The autostabilizer computer (Sfena)

(7) The radio altimeter (TRT)

(8) The VOR receiver and the VOR-ILS-DME control unit.

(9) The ILS receiver

(10) The vertical speed indicator (Air Equipment).

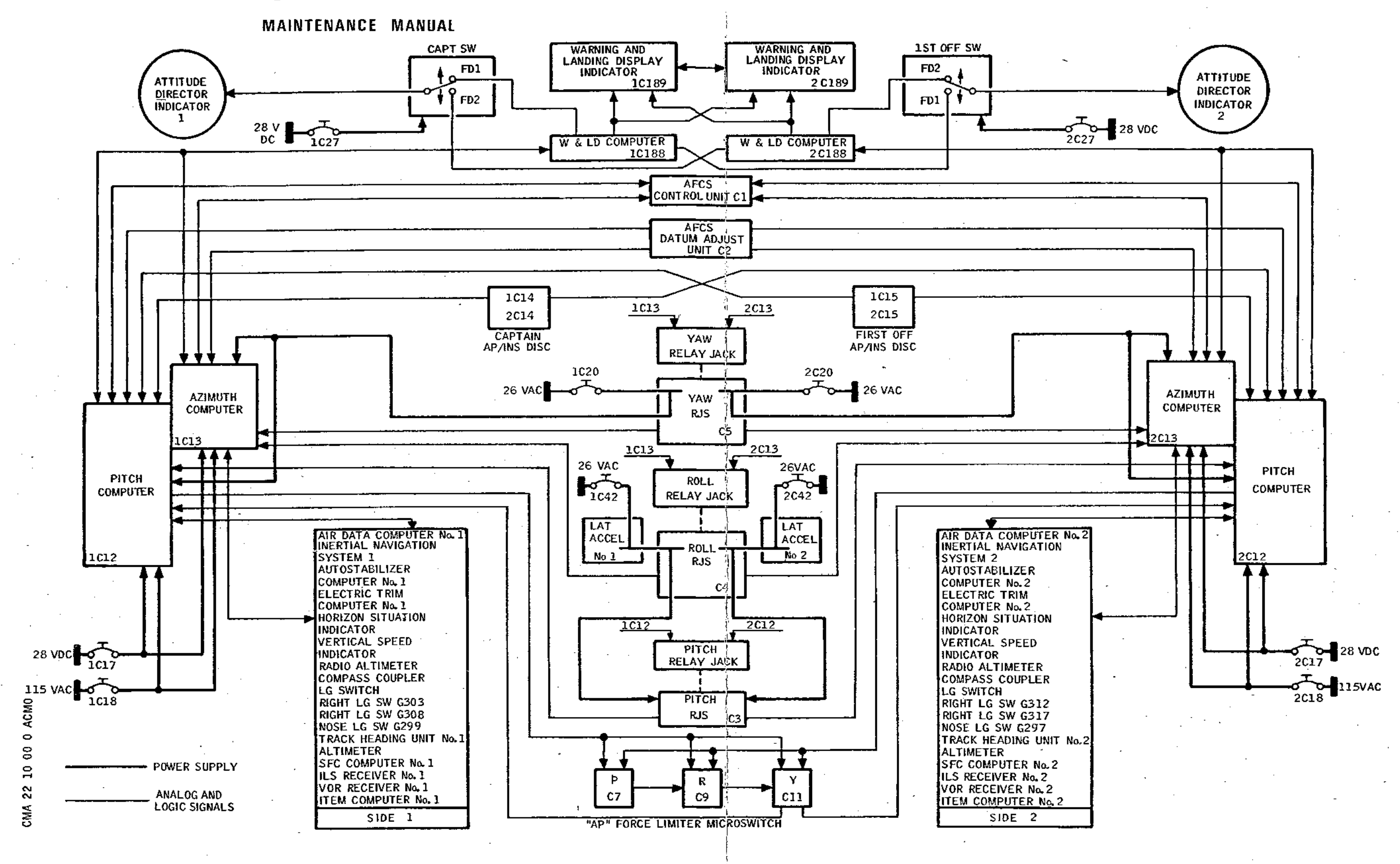
(11) The AFCS datum adjust unit (Sfena).
Ref. 22-11-00, Description and Operation.

(12) The AFCS control unit (Sfena).
Ref. 22-11-00, Description and Operation.

B. Electrical and Hydraulic Power Supplies

(1) Each AP/FD channel is provided with a separate electrical power supply in order to ensure that failure from one source does not result in the failure of the entire system. Ref. 24-00-00 (Electrical power supply), Description and Operation (AP/FD System circuit breakers).

(2) There are two independent hydraulic systems, associated with each relay jack, designated Blue and Green.
Ref. 27-14-00, Description and Operation.



AP/FD System Block Diagram
Figure 002

C. Inertial Navigation System
(Ref. Fig. 003)

(1) The aircraft is equipped with 3 Inertial Navigation Systems (INS). INS No.1 is associated with AP/FD No.1, INS No.2 with AP/FD No.2.
INS No.3 is used as a standby source and provides a third data source to the Inertial System Comparator Unit (ISCU).

Each INS supplies the associated AP/FD with the following signals.

(a) Longitudinal attitude signal, PITCH ATTITUDE.

(b) Lateral attitude signal, ROLL ATTITUDE.

(c) Lateral guidance signal, STEERING SIGNAL.

(d) Vertical acceleration signal, VERT ACCEL.

(e) Logic signal, HSI F/W.

(f) Logic signal, AUX ATT WARNING.

(2) PITCH ATTITUDE signal is used in PITCH inner loop, in PITCH mode outer loop and PITCH FD demand.
Ref. 22-12-00, Description and Operation.

(3) ROLL ATTITUDE signal is used in :

(a) TURN COMPENSATION (Ref. 22-12-00, Description and Operation).

(b) AZIMUTH Inner Loop, LOC or LAND mode Outer Loop (Ref. 22-13-00, Description and Operation).

(4) STEERING SIGNAL is used in INS mode outer loop. (Ref. 22-13-00, Description and Operation).

(5) VERT ACCEL signal is complementary filtered with BARO VERT SPEED from ADC to produce complementary filtered height rate which is used as a damping term in ALT ACQ, GLIDE SLOPE and ALT HOLD mode (Ref. 22-12-00, Description and Operation).

(6) HSI F/W Logic signal. This signal must be correct (28 VDC) on INS mode selection.

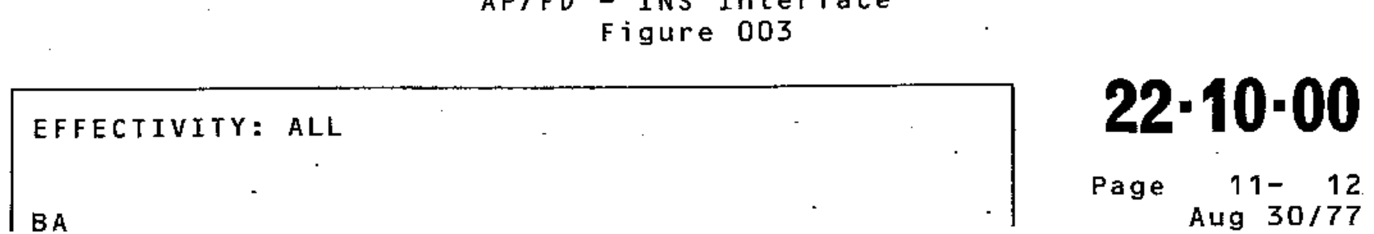
(7) ISCU Monitoring

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HSI F/W
STEERING SIGNAL
INS No. 1
ROLL ATTITUDE No. 1
ROLL ATTITUDE No. 3
PITCH ATTITUDE No. 1
PITCH ATTITUDE No. 3
VERT ACCEL
AUX ATT WARNING
C
M
C
M
M
C
PITCH COMPUTER No. 1
AZIMUTH COMPUTER No. 1
W & LD COMPUTER No. 1
AP DISC FROM W & LD
ITEM COMPUTER No. 1
ATT-INS
1
3
COMPASS COUPLER No. 1
ΨM No. 5
FLAG HEIGHT OUTPUT
CRUISE AND APPROACH DISCONNECTION
INS No. 3
ROLL ATTITUDE No. 1
PITCH ATTITUDE No. 1
VERT ACCEL
ΨP
ISCU
CRUISE AND APPROACH DISCONNECTION
FLAG HEIGHT OUTPUT
ITEM COMPUTER No. 2
ATT-INS
3
2
ΨP
COMPASS COUPLER No. 2
ΨM No. 5
AP DISC FROM W & LD
INS No. 2
AUX ATT WARNING
VERT ACCEL
PITCH ATTITUDE No. 1
PITCH ATTITUDE No. 3
ROLL ATTITUDE No. 3
ROLL ATTITUDE No. 1
C
M
M
C
M
C
PITCH COMPUTER No. 2
AZIMUTH COMPUTER No. 2
W & LD COMPUTER No. 2
STEERING SIGNAL
HSI F/W
LOGIC SIGNAL
ANALOG SIGNAL

CMA 22 10 000 AEM0

AP/FD - INS Interface
Figure 003



EFFECTIVITY: ALL

R BA

During cruise flight, the ISCU monitors the pitch and roll attitudes originated in the 3 INS'. During approach flight, it monitors the pitch and roll attitudes, heading variations, vertical accelerations from the 3 INS'. The FLAG HEIGHT OUTPUT signal from the W & LD computer causes the ISCU to charge to approach monitoring configuration. The ISCU sends a cruise or approach disconnection signal to the W & LD computer associated with the INS considered faulty.

W and LD computer No.1 or W and LD computer No.2 receives the disconnection signals from the ISCU, and the auxiliary attitude warning (AUX ATT WARNING). It sends a disconnection signal to the AP/FD (AP DISC FROM W & LD). This signal is included in the AP and FD engagement logic (Ref. 22-11-00, AP and FD Engagement Logic).

Other AP/FD disconnection conditions are indicated in 22-41-00, paragraph 3. C. (10), Description and Operation.

NOTE : The ITEM system receives the AP/FD system disconnection signal from the W & LD system ; in order to determine the origin of this AP disconnection signal, it also receives the ISCU approach and cruise disconnection signal and the AUX ATT WARNING signal.

D. Computer - Air Data
(Ref. Fig. 004)

(1) The aircraft is equipped with 2 air data computers (ADC).
ADC 1 is associated with AP/FD No.1,
ADC 2 is associated with AP/FD No.2.
Each ADC issues to the associated AP/FD the following signals :

(2) Analog signals :

The ADC issues the following parameters to the AP/FD.

(a) MACH

(a1) A mach number output (MACH NUMBER) through two linear potentiometers, for variation of gains in the AP/FD pitch and azimuth control and monitoring analog channels.

(a2) A mach hold error output through a clutchable synchro-transmitter, used in MACH HOLD mode (Ref. 22-12-00, Description and Operation).

(b) Indicated air speed, IAS :

(b1) An IAS HOLD ERROR output signal through a clutchable synchro-transmitter, used in IAS HOLD mode (Ref. 22-12-00, Description and Operation).

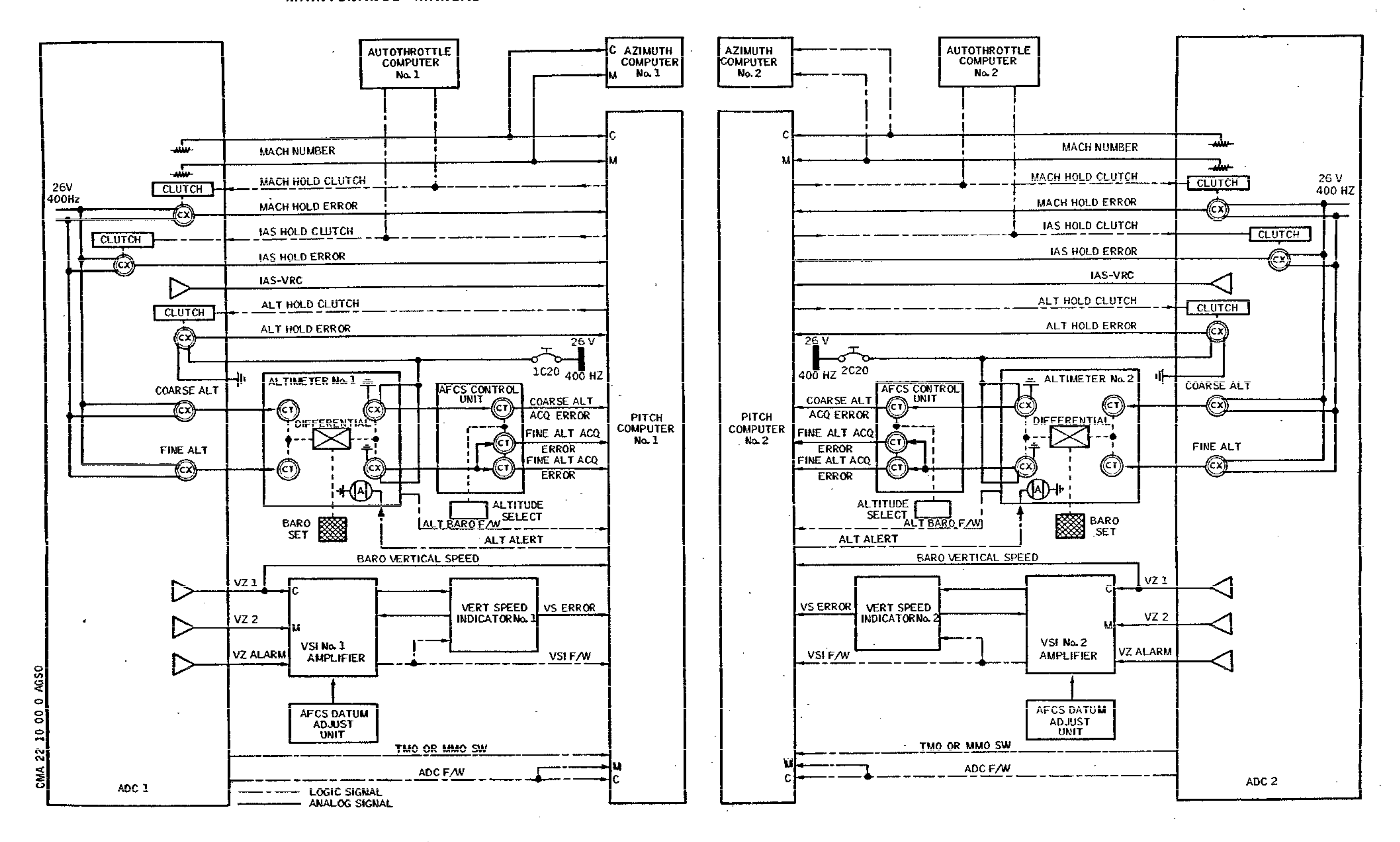
(c) IAS - VRC

(c1) A VRC (Reference Cruising Speed) output IAS - VRC through a voltage generator, used in MAX CLIMB and MAX CRUISE modes (Ref. 22-12-00, Description and Operation).

(d) Pressure altitude (Hp)

(d1) An ALT HOLD ERROR output through a clutchable synchro-transmitter used in ALT HOLD mode (Ref. 22-12-00, Description and Operation).
This synchro is supplied with 26V 400 Hz current via an AP/FD system circuit breaker.

(d2) Two altitude outputs through two synchro transmitters, used in ALT ACQ mode and in altitude acquire alert system (Ref. 22-12-00, Description and Operation, paragraph 9).



AP/FD - ADC Interface
Figure 004

- 1 coarse synchro-transmitter
- 1 fine synchro-transmitter

(e) Vertical speed

(e1) A BARO VERTICAL SPEED output ; this signal is complementary filtered with NORMAL ACCELERATION from INS, to produce complementary filtered height rate, which is used as a damping term in ALT ACQ, GLIDE SLOPE and ALT HOLD modes.

(e2) A VERTICAL SPEED output through a voltage generator used by the Vertical Speed Indicator (Ref. 22-10-00, Description and Operation, paragraph 3. L.).

NOTE : All clutchable synchro-transmitters are used in holding modes.
Generally, these modes provide holding of the control parameters to the value existing at the time of engagement.
Before engagement of a mode, the output signal providing the parameter associated with the mode varies with the aircraft configuration.
Upon selection of the mode, the associated synchro is clutched to the electrical zero.
Therefore, any variation of parameter will cause the synchro to issue an error signal to the AP/FD system in order to maintain the value existing at the time of selection.

(3) Logic signals

(a) ADC general failure warning (ADC F/W) :

- Correct operation : + 28VDC
- Failure : open circuit

This signal is included in the AP and FD engagement logic (Ref. 22-11-00, Description and Operation).

(b) TMO OR MMO SW logic signal

This signal causes the automatic engagement of MAX CRUISE mode.

(c) Altimeter validity signal (ALT BARO F/W) :

This signal must be healthy (28VDC) on selection of ALT ACQ mode.

(d) Vertical Speed Indicator (VSI) validity signal (VSI F/W) :

This signal must be healthy (+28VDC) on engagement of VERT SPEED mode (Ref. 22-10-00, Description and Operation, paragraph 3. L.).

(e) ALTITUDE ALERT signal

The altitude acquisition alert system, located in the pitch computers causes an amber warning light to come on on the Captain's and First Officer's altimeters each time the aircraft approaches or deviates from the altitude selected on the AFCS control unit (Ref. 22-11-00, Description and Operation, paragraph 9).

E. Compass Coupler
(Ref. Fig. 005)

(1) The aircraft is equipped with 2 compass couplers (CC) which process the INS platform heading and flux valve signals and issue the magnetic heading and clutched magnetic heading signals.
INS 1 or 3 signals are fed through CC1 to AP/FD No.1.
INS 2 or 3 signals are fed through CC2 to AP/FD No.2.

(2) Analog signals

(a) Clutched magnetic heading signal (CLUTCHED HDG ERROR).
This signal is issued by a clutched synchro-transmitter. It is used in HDG HOLD mode. Refer to 22-13-00, Description and Operation.

(b) Magnetic heading signal (MAGNETIC HEADING).
This signal is issued by a synchro-transmitter.
It is used in HDG/TRK mode after modification by the AFCS control unit and the track heading unit.
Ref. 22-10-00, Description and Operation, paragraph 3. G..

(c) These two above mentioned synchro-transmitters are supplied with 26V 400 Hz current via an AP/FD circuit breaker.

(3) Logic signals

(a) Compass coupler validity signal (COMPASS COUPLER F/W).

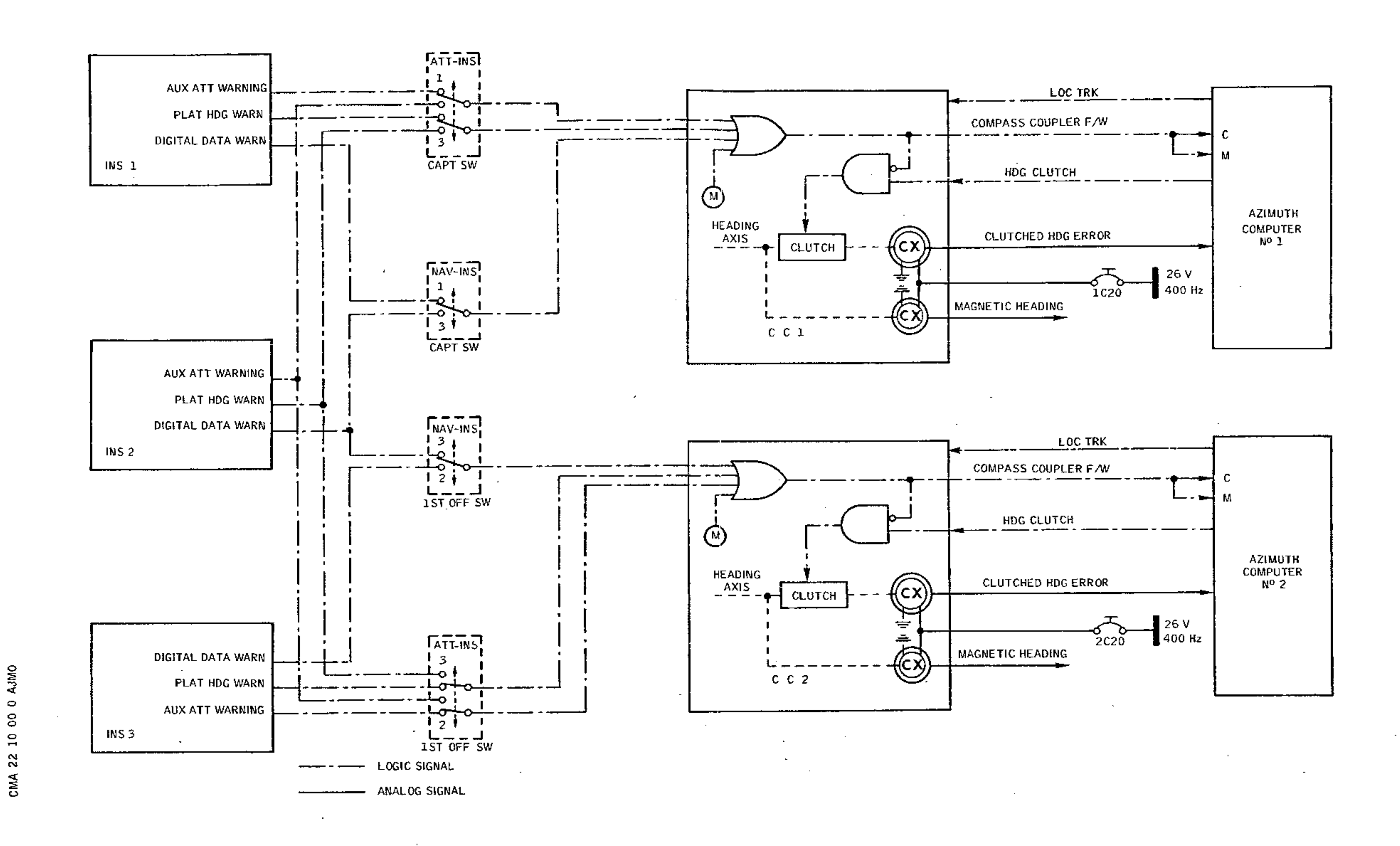
- Healthy : 28VDC
- Failure : 0V to 3.5V

This signal is fed into the AP/FD engagement logic. Refer to 22-11-00, Description and Operation.
It covers the failure warning signals from the CC internal monitoring as well as the INS failure warnings :

- AUX ATT WARNING
- PLAT HDG WARNING
- DIGITAL DATA WARNING

(b) Clutched synchro-transmitter signal (HDG CLUTCH)
On AP engagement in HDG HOLD or TURB mode, the compass coupler heading clutch is energized

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AP/FD - Compass Coupler Interface
Figure 005

(28VDC) if the TURN control knob on the AFCS datum adjust unit is in neutral position.

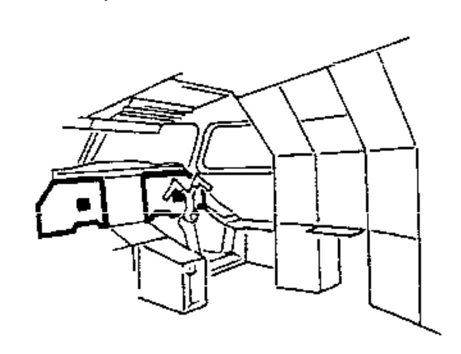
(c) LOC TRK signal

This signal, generated in the azimuth computers (when the aircraft is in the localizer axis), is applied to the compass coupler which changes to directional gyro (DG) mode.

NOTE : This change is indicated by illumination of the DG indicator light on the compass coupler control panel.

F. Indicator - Horizontal Situation (HSI)
(Ref. Fig. 006)

(1) The aircraft is equipped with 2 Horizontal Situation Indicators, one First Officer's HSI and one Captain's HSI. They are not connected directly to an AP/FD as the Track Heading Unit is inserted between the indicator and the AP/FD (Refer to next paragraph).



HDG WARNING
TRUE OR MAG MARKER
DRIFT SCALE
COURSE POINTER
COMPASS CARD
SELECTED TRACK OR HEADING POINTER
MILES
1478
GND SPD
0625
TRUE
HDG
INS OR RAD MARKER
INS
HDG
TRK OR HDG MARKER
SWITCHED INS COMPUTER OR RECEIVER NUMBER
3
AIRCRAFT SYMBOL
GLIDE/SLOPE FLAG
GS
GLIDE SCALE
N 3 6 E 12 15 S 21 24 W 30 33
DEVIATION WARNING
LATERAL DEVIATION BAR
HDG
TEST
HEADING COMPARISON WARNING LIGHT

CMA 22 10 00 0 ALMO

Horizontal Situation Indicator
Figure 006

G. Unit - Track Heading
(Ref. Fig. 007)

(1) The aircraft is equipped with two track heading units. Track heading unit 1 is associated with AP/FD No.1 and track heading unit 2 is associated with AP/FD No.2.

(2) Analog signals

(a) Heading or track error signal (HDG/TRK ERROR). This signal is issued by a synchro-transmitter supplied with 26V - 400 Hz current via an AP/FD system circuit breaker. It is used in HDG/TRK mode. Ref. 22-13-00, Description and Operation.
This signal is generated on actuation of the HDG/TRK push-pull knob located on the AFCS control unit.

(a1) HDG/TRK push-pull knob pulled : the differential synchro associated with the HDG/TRK push-pull knob provides the "heading selected minus heading" signal.
The heading is either the magnetic heading (MAG HDG) from Compass Coupler No.1 or No.2 (CC1/CC2 switch) or the true heading (TRUE HDG) from INS No.1 or No.2 (NAV 1 or NAV 2). The heading is selected by means of the RAD/INS switch.

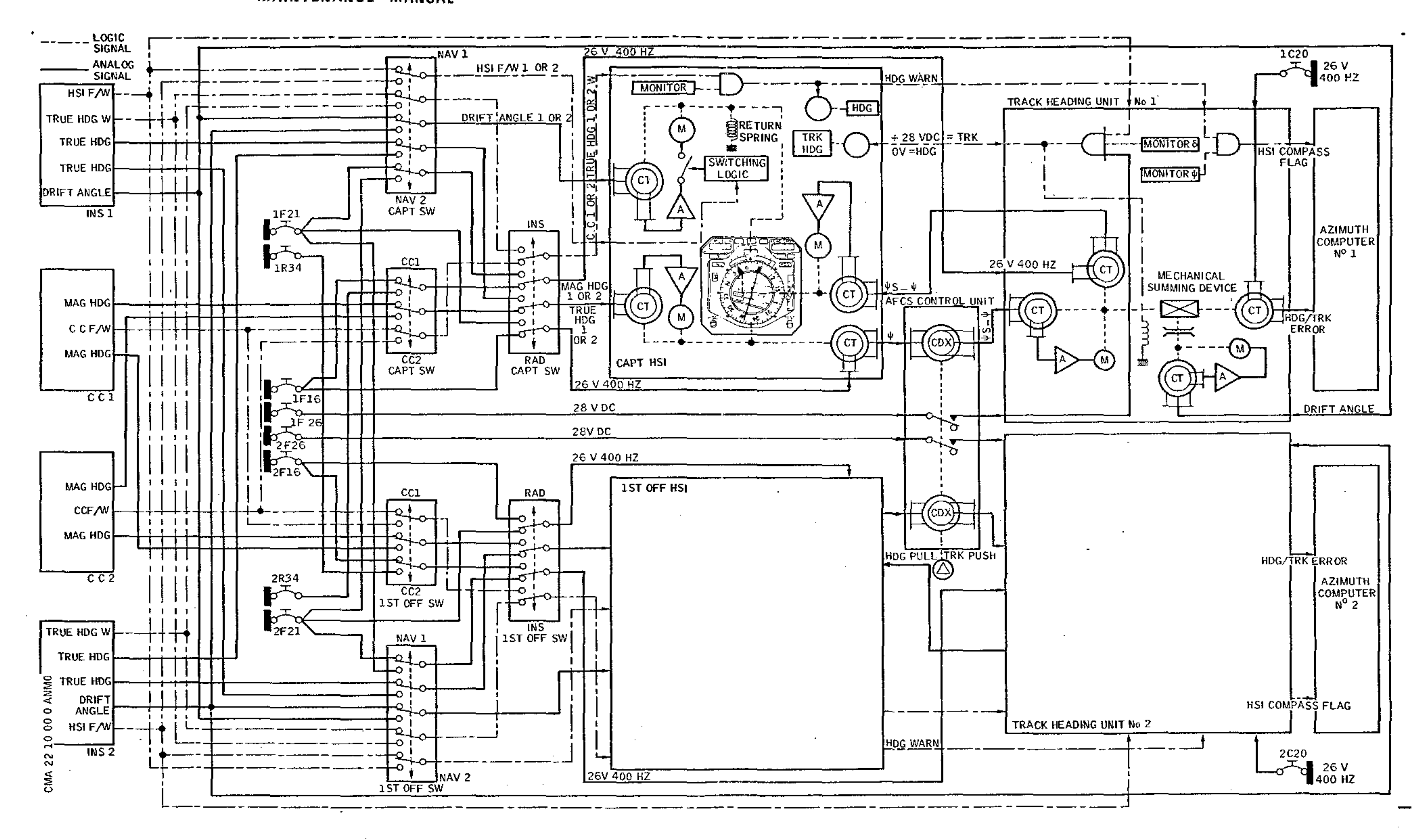
The drift synchro being declutched, the output synchro issues a signal which is the difference between the selected heading and the magnetic or the true heading.

(a2) HDG/TRK push-pull knob pushed : the signal (selected heading - heading) is produced as indicated above.
When the HDG/TRK push/pull knob is pushed, the drift angle signal from the associated INS is added in the mechanical summing device ; the signal from the output synchro is the difference between the selected heading and the magnetic or the true heading + the drift angle.

(3) Logic signals

(a) Control logic for drift clutch

The clutch coil is power supplied (+ 28VDC) when



AP/FD – Track Heading Unit Interface
Figure 007

the following conditions are met :

(a1) HDG/TRK push-pull knob pushed.

(a2) Drift (HSI F/W) validity signal (+ 28VDC) from associated INS.

(a3) Internal monitoring correct :

- Unit power supply correct
- 26V 400 Hz power supply to the synchro-transmitter associated with the selected track or heading pointer
- Drift axis (electrical or mechanical) control correct.

NOTE : This validity signal (28VDC) is applied to the HSI to display TRK marker.
When the 28VDC signal is inhibited, HDG marker replaces TRK marker.

(b) Track heading unit monitoring signal (HSI COMPASS FLAG)

This signal must be healthy (+ 28VDC) when the AP/FD system is engaged in HDG/TRK lateral mode. This signal covers the following failures :

(b1) HSI failure (HDG WARN)

(b2) Internal failures

- Failure of unit power supply
- Failure of energization of the synchro-transmitter associated with the selected track or heading pointer
- Failure of (electrical or mechanical) control in the heading axis.

NOTE : The HDG WARN failure signal causes the HDG flag to appear on the HSI. The HDG flag appears in any of the following cases :

Compass Coupler No.1 or No.2 failure if RAD/INS switch is in RAD position, true heading failure warning from INS No.1 or 2 if RAD/INS switch is in INS position, loss of 26V 400 Hz power supply, failure of the compass

card control servo-mechanism.

H. Computer - Autostabilization
(Ref. Fig. 008)

(1) The aircraft is equipped with 2 autostabilization computers.
Autostabilization computer No.1 (AS No.1) is associated with AP/FD No.1.
Autostabilization computer No.2 (AS No.2) is associated with AP/FD No.2.

(2) Analog signals

(a) Pitch rate signal (PITCH RATE)
This signal is produced by the autostabilization system pitch rate-gyro and, after demodulation, transmitted to the AP/FD pitch computer. It is used in the pitch AP inner loop.
(Ref. 22-12-00, Description and Operation).

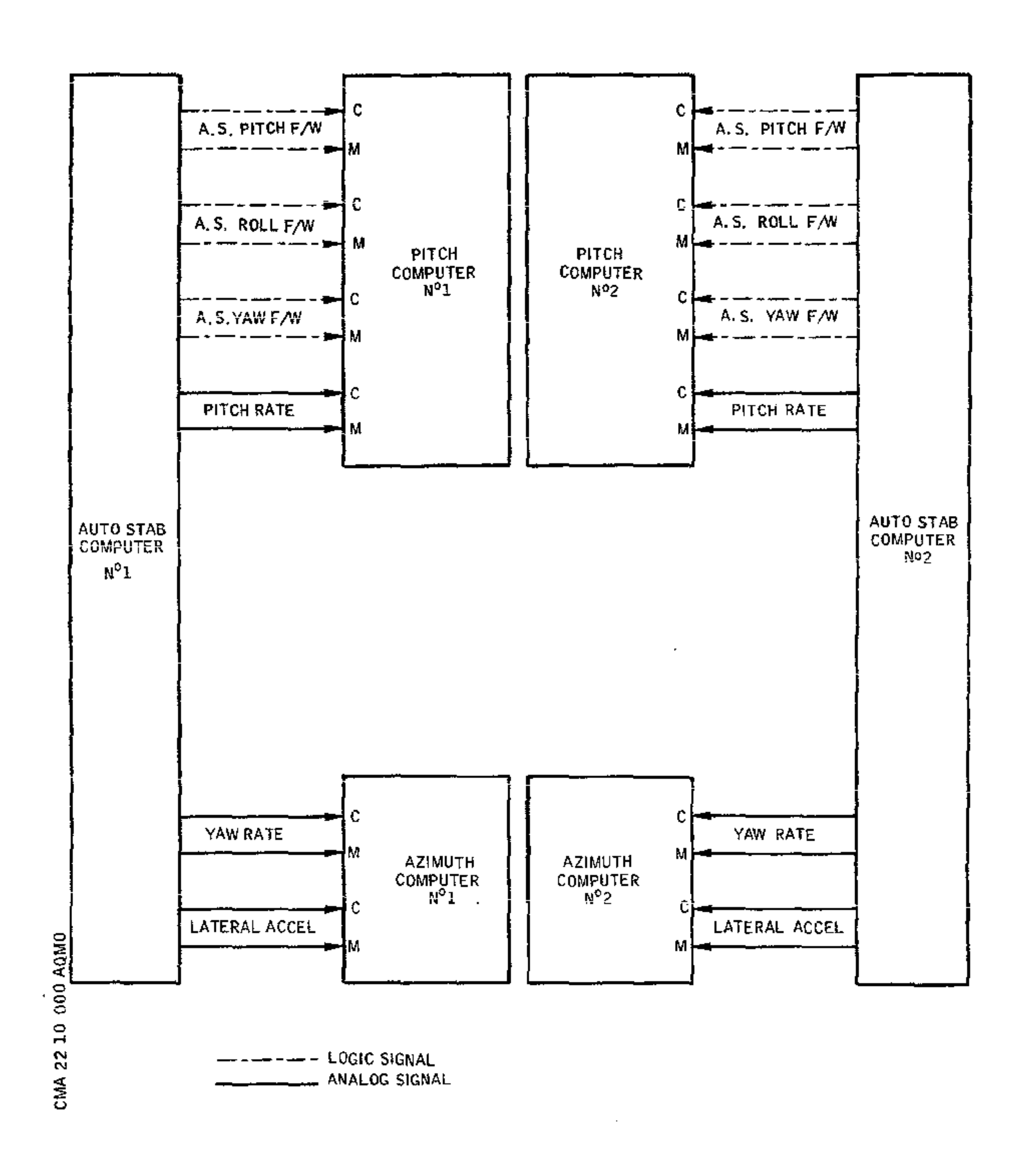
(b) Yaw rate signal (YAW RATE)
This signal is produced by the autostabilization system yaw rate-gyro and, after demodulation, transmitted to the AP/FD azimuth computer.
It is used in the AP azimuth inner loop and outer loop (LOC or LAND mode).

(c) Lateral acceleration signal (LATERAL ACCEL).
This signal is produced by the autostabilizer system yaw accelerometer, demodulated, then transmitted to the AP/FD azimuth computer.
It is used in the azimuth AP inner loop and outer loop in LOC or LAND mode (Ref. 22-13-00, Description and Operation).

(3) Logic signals

(a) Validity signals for each autostabilization axis.
(AS PITCH, ROLL, YAW F/W).

These three logic signals (control and monitoring) are included in the AP/FD engagement logic.
(Ref. 22-11-00, Description and Operation AP and FD, Engagement Logic).



AP/FD - Autostabilization Computer Interface
Figure 008

I. Radio Altimeter
(Ref. Fig. 009)

(1) The aircraft is equipped with two radio altimeters. They indicate the aircraft altitude in relation to the ground without taking into account atmospheric pressure. They are specially designed to provide high accuracy in flight at low altitude, therefore in approach.

Radio altimeter No.1 is associated with AP/FD No.1, radio altimeter No.2 is associated with AP/FD No.2.

(2) Analog signals

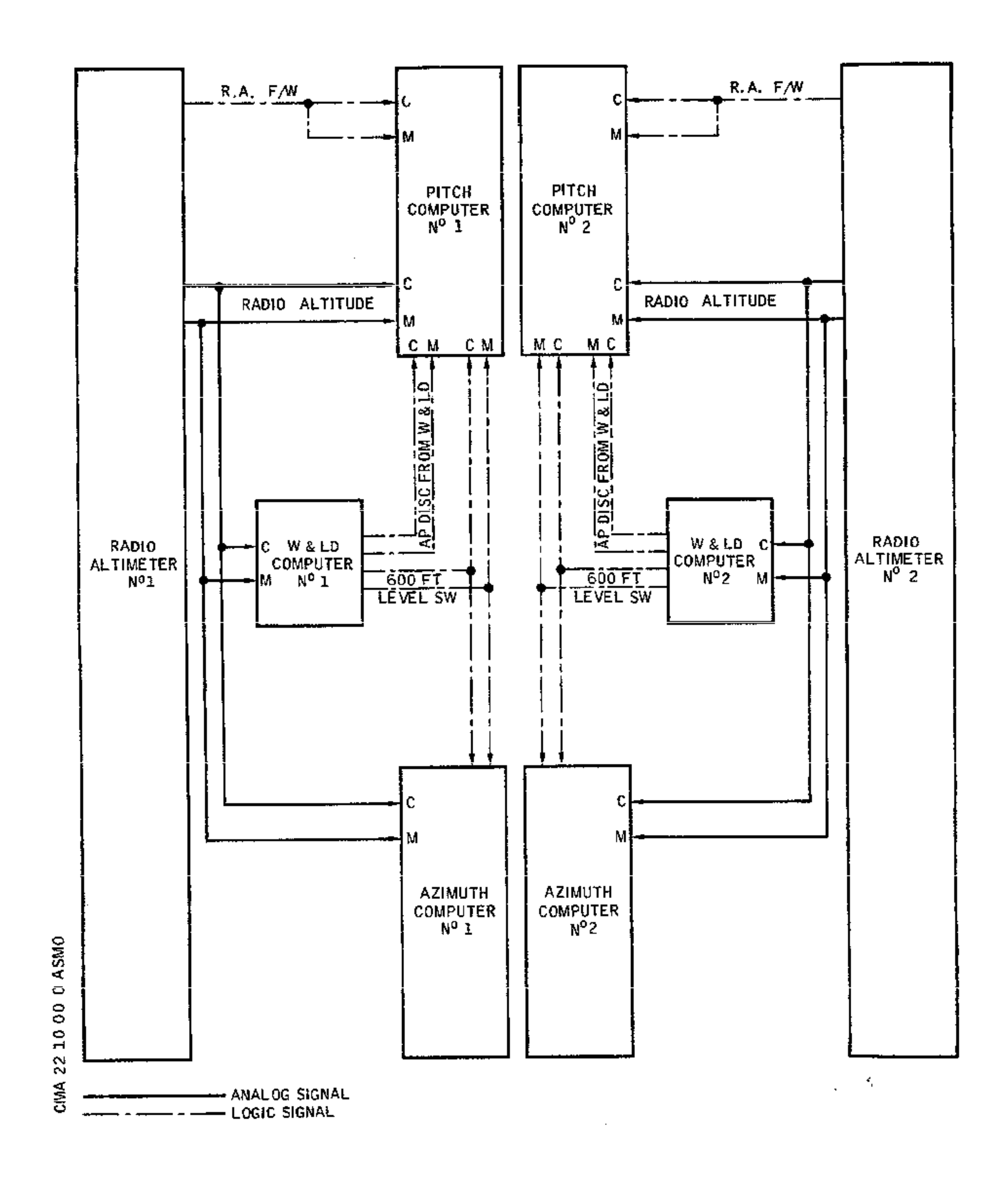
(a) Radio altimeter signal : RADIO ALTITUDE

This analog signal is used by the AP/FD system to generate variable gains and limits as a function of radio altitude as well as the flare law and the change over signals at certain predetermined altitudes.
(Ref. 22-12-00 and 22-13-00, Description and Operation).

(3) Logic signals

(a) Radio altimeter validity signal (RA F/W).
This signal must be healthy (+ 28VDC) to inhibit ADC validity in approach mode when radio altitude is below 1,500 ft.
(Ref. 22-11-00, Description and Operation, AP and FD Engagement Logic).

NOTE : The W & LD computer receives logic and analog signals, and issues a 600 ft level signal (600 FT LEVEL SWITCH) and a disconnection command signal (AP DISC FROM W& LD) to the AP/FD system.
The generation of these signals is dealt with in 22-41-00, Description and Operation paragraph 5. C. (10).



AP/FD - Radio Altimeter Interface
Figure 009

J. Receiver - VOR and Control Unit - VOR-ILS-DME
(Ref. Fig. 010)

(1) The aircraft is equipped with two VOR receivers and two VOR-ILS-DME control units.
VOR receiver No.1 and VOR-ILS-DME control unit No.1 are associated with AP/FD No.1.
VOR receiver No.2 and VOR-ILS-DME control unit No.2 are associated with AP/FD No.2.

(2) Analog signals

(a) Vor beam error signal (VOR BEAM ERROR)

This signal indicates the discrepancy between the actual radial and the desired radial. It is generated in the VOR receiver which receives the following information :

- Selected VOR frequency (depending on the beacon to which the aircraft is heading)
- Angular deviation issued from an AFCS control unit resolver associated with the VOR/LOC knob.

It is used in VOR mode.
(Ref. 22-13-00, Description and Operation).

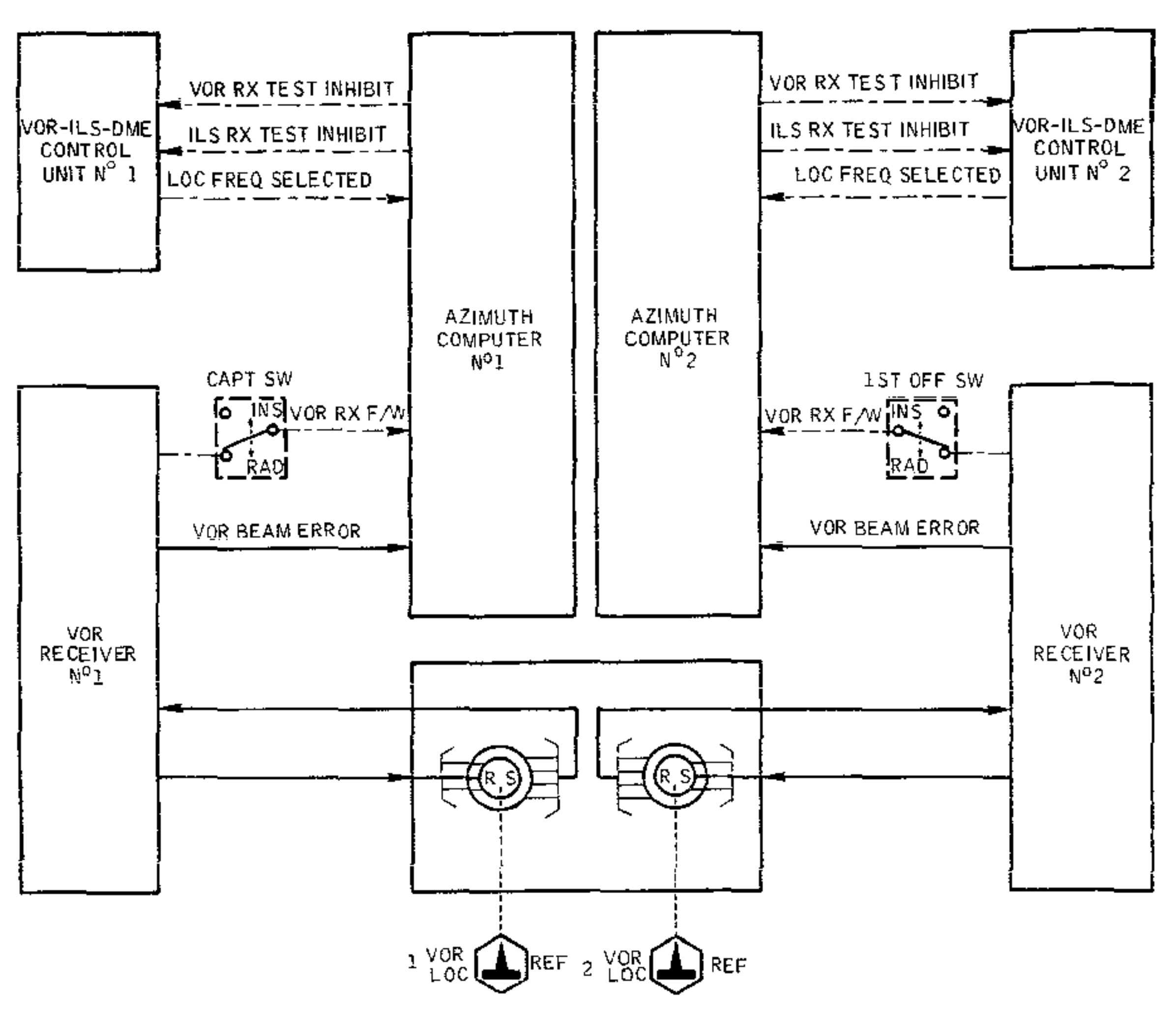
(3) Logic signals

(a) VOR receiver validity signal (VOR RX F/W).
This signal is included in the VOR mode logic.
It is transmitted when RAD/INS switch is in RAD position.
(Ref. 22-13-00, Description and Operation).

(b) Selected LOC frequency (LOC FREQ SELECTED)
This signal (OV) is included in VOR mode and LOC mode logic. (Ref. 22-13-00, Description and Operation).

(c) VOR test inhibition (VOR RX TEST INHIBIT)
When VOR mode is selected, the AP/FD system inhibits VOR test signal (test inhibited : open circuit, test possible : OV).

(d) ILS test inhibition (ILS RX TEST INHIBIT)
When LOC mode or LAND mode is selected, the AP/FD system inhibits ILS test signal (test inhibited : open circuit, test possible : OV).



AP/FD - VOR Receiver and VOR-ILS-DME Control Unit Interface
Figure 010

K. Receiver - ILS
(Ref. Fig. 011)

(1) The aircraft is equipped with 2 ILS receivers.

ILS receiver No.1 is associated with AP/FD No.1,
ILS receiver No.2 is associated with AP/FD No.2.

(2) Analog signals

(a) LOC beam error signal (LOC BEAM ERROR)
This signal is included in the LOC mode monitoring and control analog channels. (Ref. 22-13-00, Description and Operation).

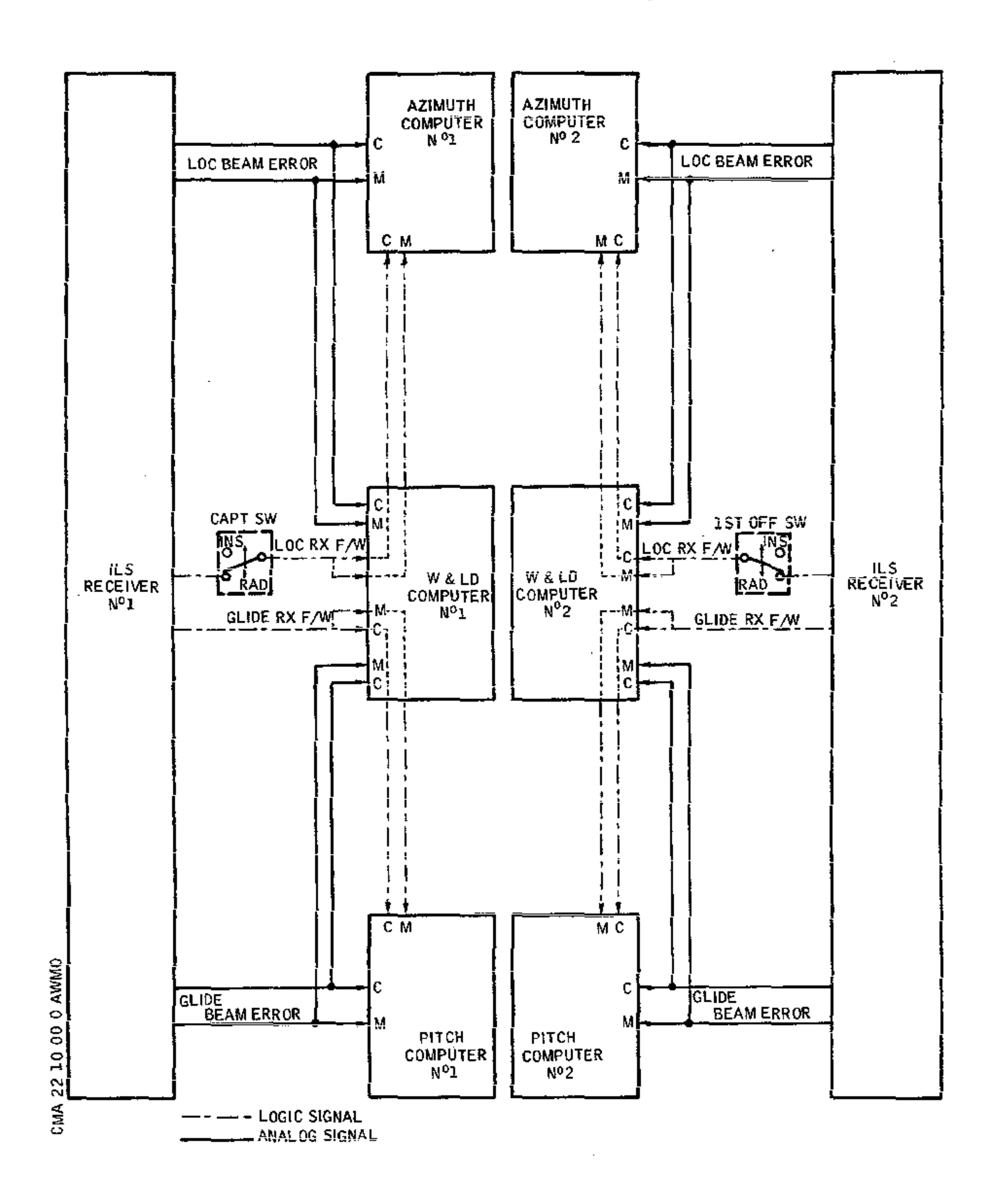
(b) Glide beam error signal (GLIDE BEAM ERROR)
This signal is included in the GLIDE mode monitoring and control analog channels (Ref. 22-12-00, Description and Operation).

(3) Logic signals

(a) LOC receiver validity signal (LOC RX F/W)
This signal is used in the LOC mode logic. It is energized when RAD/INS switch is in RAD position.
(Ref. 22-13-00, Description and Operation).

(b) Glide receiver validity signal (GLIDE RX F/W)
This signal is used in the GLIDE mode logic.
(Ref. 22-13-00, Description and Operation).

NOTE : These validity signals are fed through the W & LD computers for ILS failure signal generation. (Ref. 22-41-00, Description and Operation).



AP/FD - ILS Receiver Interface
Figure 011

L. Indicator - Vertical Speed
(Ref. Fig. 012)

(1) Each pilot is provided with one Vertical Speed Indicator (VSI).
Each VSI is power supplied via an amplifier. Each AP/FD is associated with a VSI-Amplifier assembly.

(2) Analog signals

(a) Vertical speed error signal (VERTICAL SPEED ERROR)

This signal, issued from the vertical speed indicator, results from the discrepancy between the commanded speed pointer indication and the vertical speed pointer indication.
It is the command signal in VERT SPEED mode (Ref. 22-12-00, Description and Operation).
The commanded speed pointer moves through operation of the AUTOPILOT NOSE UP-NOSE DOWN toggle switch located on the AFCS datum adjust unit, enabling the pilot to select a new commanded vertical speed.

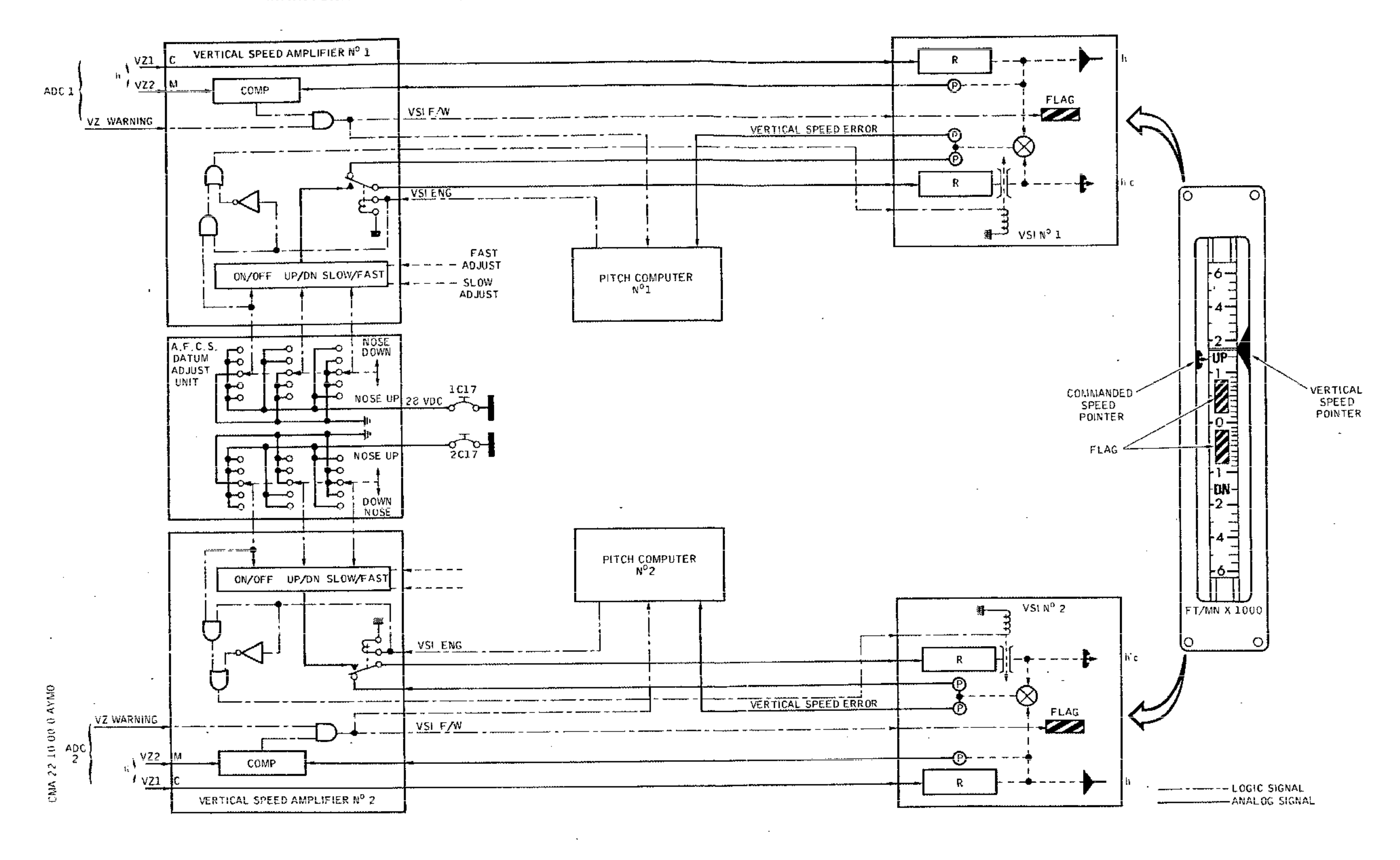
On selection of a new commanded vertical speed (Vz), the vertical speed amplifier receives the ON/OFF, UP/DOWN, SLOW/FAST signals from the AFCS datum adjust unit. The resulting signal is then applied to the commanded Vz motor which moves at a certain speed until the desired value is reached. This vertical speed error signal is transmitted to the AP/FD system control circuits which enable the ADC to bring Vz to the desired vertical speed. When the desired Vz is reached, the vertical speed pointer is facing the commanded speed pointer.

NOTE : By means of the datum adjust unit, the vertical speed may be adjusted on all the VSI range (plus or minus 6,000 ft/mn) to the following variation speeds :

- Slow : 80 ft/mn/s
- Fast : 800 ft/mn/s

Depending on the state of engagement of the systems, control of the VSI commanded vertical speed pointers is determined as indicated in the following table :

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AP/FD - VSI Interface
Figure 012

STATE OF ENGAGEMENT OF SYSTEMS	VSI No.1	VSI No.2
AP 1 engaged, in control FD 1 and FD 2 engaged	in control	in synchronization
AP 2 engaged, in control FD 1 and FD 2 engaged	in synchronization	in control
FD 1 and FD 2 engaged or FD 1 engaged	in control	in synchronization
FD 2 engaged	in synchronization	in control

VSI in control : commanded vertical speed pointer fixed, unless AFCS datum adjust unit AUTOPILOT NOSE UP/NOSE DOWN toggle switch is activated.

VSI in synchronization : Continuous synchronization of the aircraft vertical speed pointer with the commanded speed pointer.

(3) Logic signals

(a) VERT SPEED mode selection signal (VSI ENG).
This signal is applied through the amplifier (28VDC) to the datum adjust unit in order to command the VSI commanded speed pointer.
The logic takes into account the state of engagement of the systems.

(b) VSI validity signal (VSI F/W)

This signal must be correct (+ 28VDC) on AP/FD VERT SPEED mode engagement.
Ref. 22-11-00, Description and Operation.
AP and FD engage logic failure (loss of + 28 VDC supply) causes a flag to appear on the VSI.

This signal results from either failure :

- Failure of Vz transmission detected through

comparison
- Failure of Vz detected through ADC monitoring.

NOTE : This Vz warning is associated with the altitude warning which triggers the ADC general warning.
Therefore, a flag appearing on the VSI without an associated ADC general warning, indicates failure of the instrument (VSI).

4. Integration of Autopilot in Flight Control System
(Ref. Fig. 013)

A. In Cruise Flight

During cruise flight, only one AP can be engaged : if the second AP is engaged a logic signal called SERVO INHIBIT causes the first AP to disengage (the AP engagement logic is dealt with in 22-11-00, Description and Operation, paragraph 4.).

(1) Operation

On engagement of AP No.1 (for example) the SERVO ARM signal generated by the engagement logic opens the three Blue electrovalves (EV).
Electrovalve opening ensures :

- Servo valve (SV) pressurization
- Locking of input lever on relay jack (RJ) body
- Operation of microswitches confirming this locking by means of CENTRE LOCKS signal to AP engagement logic

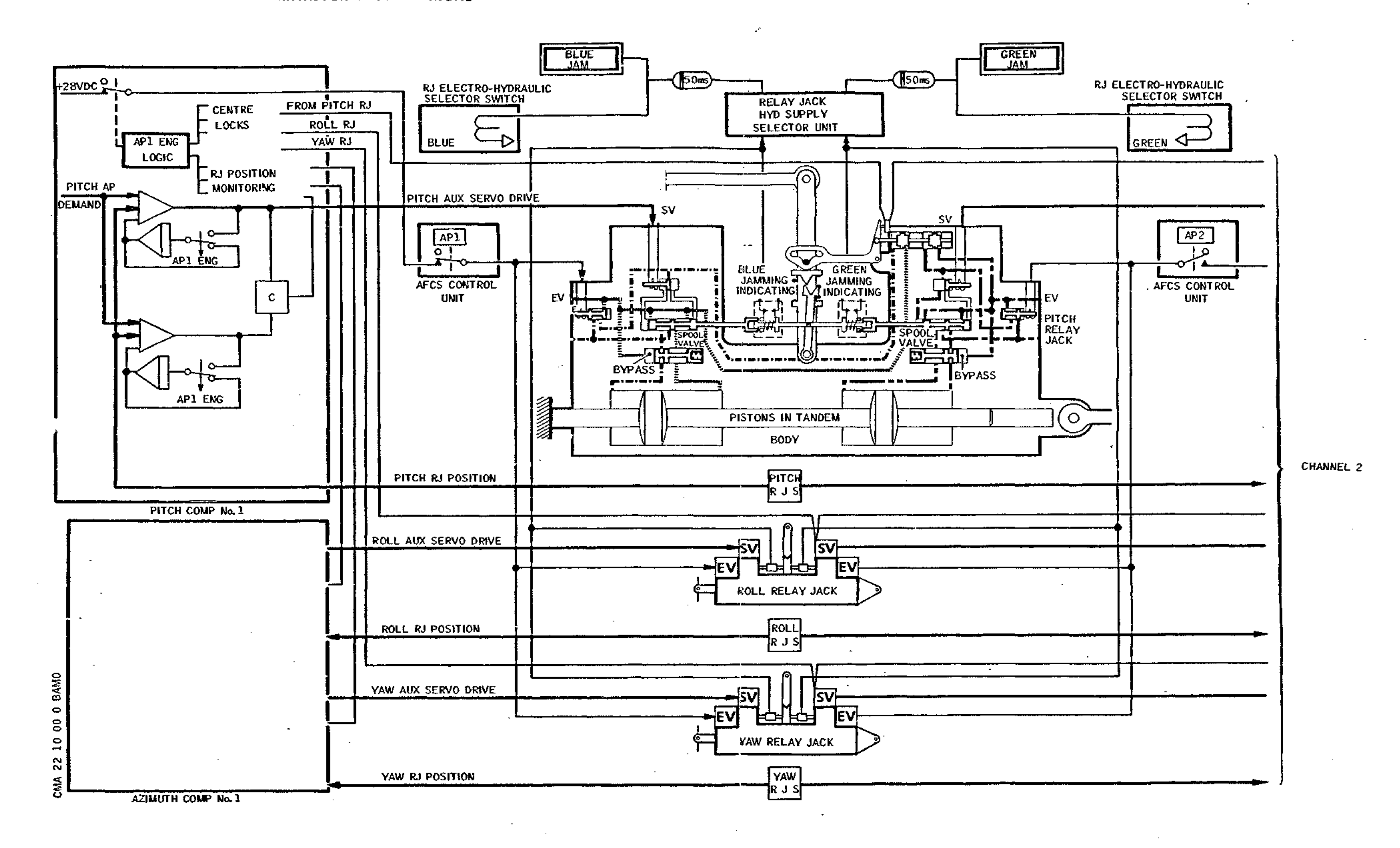
The control signals from the computers activate the Blue servovalves (SV) which drive the Blue and Green spool valves. These spool valves distribute the pressure in the jack chambers and ensure RJ motion until the desired position is obtained.
Servo-control is ensured by means of relay jack sensors (RJS). Comparators cause AP disconnection if the difference between the control order and the position return is greater than 2 degrees. When operating, the RJ drives the flight control electrical channel resolvers as well as the manually operated controls through the AP force limiter

Therefore demands are transmitted to the power flight control units (PFCU) through the electrical channels of the flight controls (Ref. 27-16-00 - 27-26-00 - 27-36-00, Description and Operation).

NOTE : The pitch RJ servovalves receive autopilot demands from the associated AP/FD pitch computer (Ref. 22-12-00, Description and Operation).

The yaw and roll RJ servovalves receive autopilot demands from the associated AP/FD azimuth computer (Ref. 22-13-00, Description and Operation).

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RJ Operation During AP Control
Figure 013

(2) Spool Valve Jamming

Assume that AP1 remains engaged.

(a) Blue spool valve jamming :

In the case of Blue spool valve jamming, the relevant comparator causes AP No.1 to disengage, as the control order no longer corresponds to the position return order. The flight controls then revert to manual operation. On pilot operation, the Blue spool valve jamming microswitch causes the Blue side of the hydraulic system to be automatically shut down while the BLUE JAM caption light illuminates on RELAY JACK unit (ceiling panel). In order to confirm this operation, the pilot switches the switch located on this unit to GREEN ONLY.

(b) Green spool valve jamming

AP1 actuates the Blue spool valve, which compresses the Green spool valve jamming microswitch. The Green hydraulic system is then shut down and the GREEN JAM caption light illuminates. In order to confirm this operation, the pilot switches switch to BLUE ONLY. The associated comparator does not cause AP disengagement, as the error caused by jamming is corrected within the time constant of the comparator.

NOTE : The above description refers to operation when AP1 is engaged.
When AP2 is engaged, the operation is similar. In this case, the Green side electrovalve is open and the Green side servovalve activates the two spool valves.
For Green spool valve jamming. The AP2 switch is disengaged by an order from the associated comparator and on pilot operation the Green hydraulic system is shut down. For Blue spool valve jamming, the Blue hydraulic system is shut down.

B. In approach

When LAND mode is selected on AFCS control unit, SERVO INHIBIT signals are overridden and both APs can be engaged simultaneously in this mode.

In this configuration, AP1 ensures the aircraft control while AP2 is in stand-by.

(1) Operation

RJ operation remains unchanged, as :

- AP2 electrovalve remains closed. (AP1 is operating and transmits a SERVO INHIBIT signal following which stand-by AP2 cannot open the associated electrovalves)
- Piloting demands from the stand-by computers are synchronized at zero (this synchronization is ensured through "loop" integrators on the output amplifier).

AP1 ensures piloting control by controlling the associated servovalves. AP2 is in stand-by ; on AP1 disconnection, there is an automatic change-over and AP2 takes over flight control :

- Associated electrovalves open
- Synchronizing integrators discharge with a slow time constant (10 s).

(2) Spool valve jamming

(a) Blue spool jamming

In the case of Blue spool valve jamming the associated comparator causes AP1 disengagement. The stand-by AP2 becomes operative and drives the Green spool valve. The Green spool valve compresses the Blue spool valve jamming microswitch which causes Blue hydraulic system shut-down and BLUE JAM caption light illumination.

In order to confirm this operation, the pilot switches switch to GREEN ONLY. The associated channel 2 comparator cannot cause AP2 disengagement as the error is corrected before the comparator time constant elapses.

(b) Green spool valve jamming

AP1 actuates Blue spool valve which compresses the Green spool jamming microswitch ; this results in Green hydraulic disconnection and GREEN JAM caption light illumination. In order to confirm this operation, the pilot switches switch to BLUE ONLY. AP1 remains engaged.

NOTE : Refer to cruise phase if a single AP is engaged during approach mode.

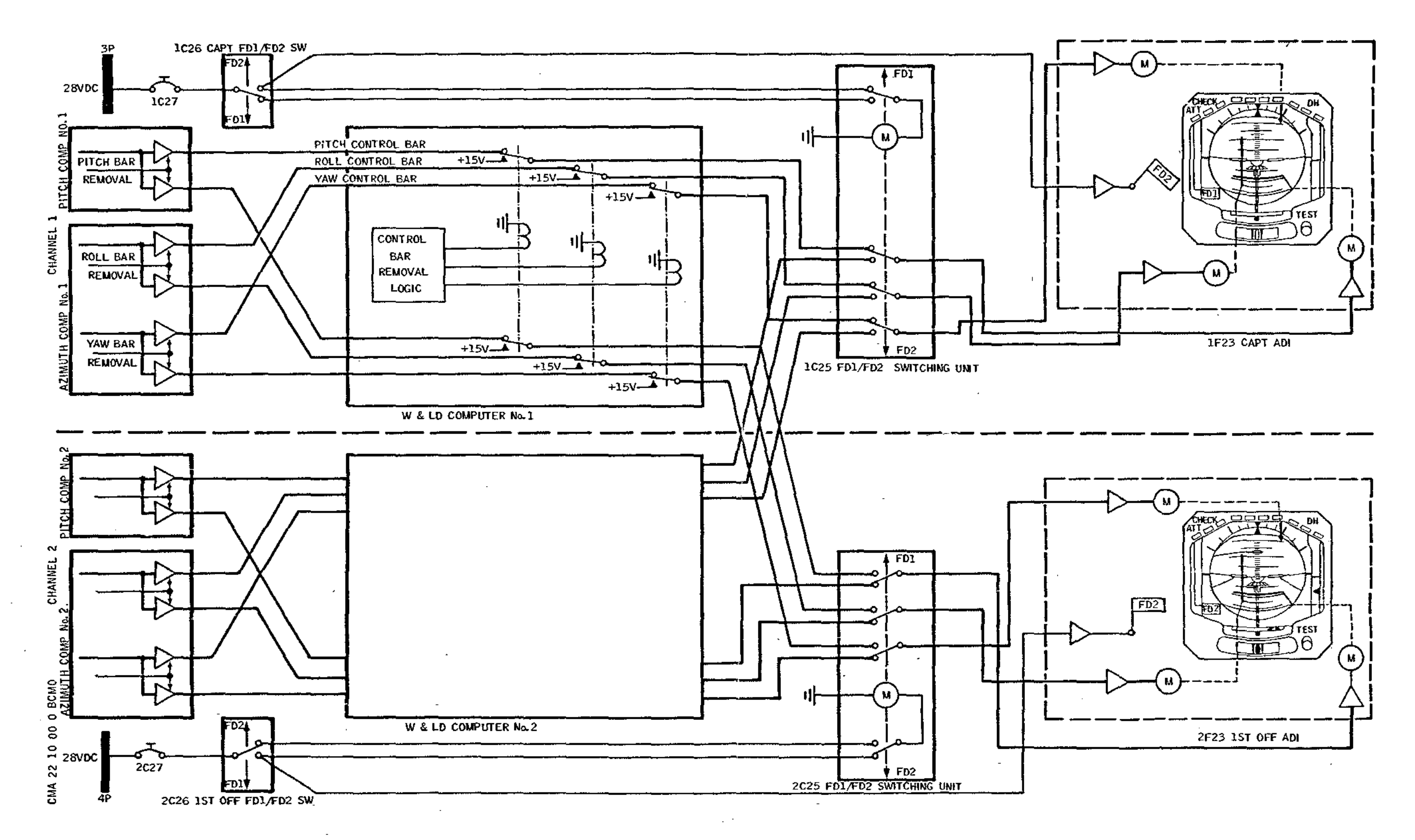
5. Integration of Flight Director into Aircraft System (Ref. Fig. 014)

A. The aircraft is equipped with 2 Attitude Director Indicators (ADI).
As a rule, FD No.1 is associated with ADI 1, and FD No.2 is associated with ADI 2.
However, FD1/FD2 switches located on the Captain's and the First Officer's instrument panels enable both ADIs to be connected to either computer.
An FD1/FD2 indication displayed on each ADI shows which computer is connected to the instrument.

B. The FD bar analog control signals (PITCH, ROLL and YAW CONTROL BAR) are generated by the associated AP/FD computer These signals can be cancelled at the output amplifier by an internal computer logic signal (PITCH, ROLL or YAW BAR REMOVAL).
The PITCH BAR REMOVAL signal is dealt with in 22-12-00, Description and Operation, paragraph 3.
The ROLL BAR REMOVAL and YAW BAR REMOVAL signals are dealt with in 22-13-00, Description and Operation, paragraph 3.

These analog signals are sent through the W & LD computers. If an ILS receiver fault is detected in automatic approach, the W & LD computers cause removal of the corresponding FD bar.
FD bar removal logic is dealt with in 22-41-00, Description and Operation, paragraph 5.C.(9).

NOTE : The bars on each ADI are tendency bars. They are directional and they indicate the flight demands without showing the aircraft position with respect to selected flight path.



FD - ADI Interface
Figure 014

6. System Operation

A. Engagement

(1) Autopilot

Upon selection of the AP engage switch, located on the AFCS control unit, and provided the internal monitoring and external interlocks are healthy, the engage switch will be magnetically held in the up position.

During dual channel operation, after LAND PRIME, both AP channel 1 and AP channel 2 engage switches can be held in the engaged position. Channel 1 will be in control with channel 2 in a synchronizing standby condition.

Initial engagement of either AP will result in the illumination of the associated AP indicator light (green) and the illumination of both the basic mode selection push-buttons, PITCH HOLD and HDG HOLD, unless the other AP or either FD is already engaged in LAND, GLIDE or a related PRIME mode in which case the selected AP will immediately engage in the established mode.

Upon engagement of an AP channel, both Electric Trim channels will revert to Autotrim, maintaining the neutral point of the Artificial Feel System at the steady state pitch elevon position and preventing transients upon AP disengagement.

(2) Flight Director

Upon selection of the FD engage switch located on the AFCS control unit, and provided the internal monitoring and external interlocks are healthy, the engage switch will be magnetically held in the up position. Irrespective of the state of engagement of the AP, both FD channels may be engaged simultaneously throughout the flight.

The ADI control bar of any one axis will be in view only if a FD channel is operative for that particular FD mode.

Irrespective of the state of engagement, a failure detected in any one axis results in the generation of an FD flag signal. Subsequent failures, during FD engagement, will cause the active control bars to

be removed and the associated channel to be disconnected.

Initial engagement of either FD with no other AP or FD engaged will result in illumination of the PITCH HOLD mode push-button, the azimuth bars being out of view. If one FD channel is already engaged, the other channel will engage in the established mode.

(3) Combined Autopilot and Flight Director Engagement

If one AP channel is already engaged the FD will engage in the established AP mode.
Engagement of either AP with one or both FD channels engaged in a cruise mode will cause the engaged FD channel to revert to PITCH HOLD but with the pitch control bar biased out of view.

Approach conditions are dealt with in paragraph 2. A. (1).

B. Mode Selection/Indication/Operation (Ref. Fig. 001)

Following successful engagement, other AP or FD modes may be selected by depression of the appropriate mode selection button located on the AFCS control unit. Successful selection of the new mode is indicated by extinction of the previous mode push-button and illumination of the newly selected mode push-button.
Selection of a mode incorporating a 'prime' facility, will result in the illumination of the relative 'prime' indicator, the previous mode push-button remaining illuminated. Initiating the capture of a mode with a prime facility results in the illumination of the appropriate mode button and the extinction of both the previously engaged mode button and the associated 'prime' indicator, clearly indicating the controlling mode.

(1) Cruise modes

(a) PITCH HOLD

The aircraft's pitch attitude is maintained to that existing at the time of engagement of the mode. Changes in the pitch datum may be demanded by operation of the datum adjust control. The pitch axis control will revert to this mode if any incompatible Autothrottle mode is selected.

(b) IAS HOLD

The aircraft's speed is maintained to the IAS existing at the time of engagement of the mode. Changes about the datum may be demanded by operation of the datum adjust control.

(c) MACH HOLD

The aircraft's speed is maintained to the Mach number existing at the time of engagement of the mode. Changes about the datum may be demanded by operation of the datum adjust control.

(d) VERTical SPEED

The aircraft's height rate is maintained to that existing at the time of engagement of the mode. Any error between the engaged datum and the aircraft vertical speed will be indicated as a discrepancy between the 'datum bug' and the 'indicator bug' on the Vertical Speed Indicator (VSI). The 'datum bug' may be slewed to a new height rate datum by operation of the datum adjust control.

(e) ALTitude HOLD

The aircraft's height is maintained to the barometric altitude existing at the time of engagement of the mode. Changes about the datum may be demanded by operation of the datum adjust control. Changes of barometric reference setting will not affect the controlling altitude datum.

(f) MAX CLIMB, MAX CRUISE

The aircraft's speed is constrained to a reference cruising speed (VRC) generated by the ADC.

(f1) MAX CLIMB

The pilot presses MAX CLIMB push-button which illuminates.
The AP/FD maintains VRC at VMO (530 kt).
Changes about VRC may be demanded by operation of the datum adjust control.
The autothrottle associated with the AP/FD in operation is engaged but declutched (No autothrottle mode illuminated).

(f2) MAX CRUISE

Engagement of the MAX CRUISE mode is automatic and occurs when VRC leaves VMO (530 kt) limit to remain within Mach (2.00) limit or temperature (TMO) limit.
MAX CLIMB and MAX CRUISE indicator lights are both illuminated.
Operation of the datum adjust control is ineffective.
Autothrottle is clutched in MACH HOLD mode.

(g) TURBulence

The aircraft's pitch attitude and heading are loosely constrained to those existing at the time of engagement. Changes about the datums may be demanded by operation of the datum adjust controls. Deselection of the mode is achieved by selection of either PITCH HOLD or HDG HOLD when both axes of the AP will revert to the basic engage condition.
Selection of this mode results in increased monitoring thresholds and a reduced Autotrim rate. This is an AP mode only.

(h) ALTitude ACQuire

The aircraft will automatically capture the preselected altitude which has been set on the AFCS control unit and upon attainment of the altitude, the mode configuration will automatically revert to ALT HOLD.
This mode has a 'prime' facility which permits selection prior to the capture point, this condition being indicated by illumination of the prime indicator. The barometric datum for channel 1 is set on the Captain's altimeter and that for channel 2 on the First Officer's altimeter.

(i) Heading hold (HDG HOLD)

The aircraft's heading is maintained to that existing at the time of engagement of the mode. Changes in the heading may be demanded by operation of the TURN control. This is an AP mode only.

(j) Track heading (TRK/HDG)

The aircraft captures and maintains the HSI reference which is set by rotation of the HDG/TRK preset knob on the AFCS control unit. True or magnetic reference is selected externally.

Operation in HDG or TRK is selected by push-pull action on the TRK/HDG preset knob and indicated by marker on the HSI.

(k) Inertial navigation (INS)

In this mode, the aircraft captures and maintains the track between two 'way points' set into the Inertial Navigation System.

(l) VOR

During cruise, selection of VOR/LOC push-pull knob causes the aircraft to capture and maintain the selected VOR radial set on the AFCS control unit, with continuation of control through the 'cone of confusion' and continue outbound on the reciprocal radial. This mode incorporates a 'prime' facility which permits control in any other mode prior to initiation of the capture.

(m) BACK BEAM (FD mode only)

This mode can be used for tracking the reverse side of a Localiser beam

(2) Approach and land modes

Two approach modes are available :

LAND mode, which is the normal mode selection for an automatic approach, including beam capture and holding and continuation to an automatic touch-down. Pilot action can initiate an automatic GO-AROUND facility in the LAND TRK phase.

Glide mode, is a reversionary mode providing automatic beam capture/holding, automatic GO-AROUND facility is available as in LAND mode.

(a) LAND

Selection of LAND mode results in the illumination of three prime indicator lights : LAND, VOR/LOC and GLIDE.

Upon capture of the LOC beam, the previous azimuth mode and VOR/LOC prime indicator lights will be extinguished and the VOR/LOC push-pull knob will illuminate.

At the initiation of Glide capture, the previous pitch mode and GLIDE prime indicator lights will be extinguished and the GLIDE push-button will illuminate.

When the aircraft is stabilized on the LOC beam and GLIDE capture has been initiated, the VOR/LOC, GLIDE and LAND prime indicator lights will be extinguished and only the LAND mode push-button is illuminated.

A Flight Director runway guidance facility is provided after touchdown using the Yaw control bar.

(b) GLIDE

Selection of this mode by the GLIDE push-button, primes both LOC and GLIDE functions. The capture indication is similar to that in the LAND mode except that at LOC GLIDE capture the VOR/LOC and GLIDE push-buttons illuminate.

If only the LOC mode is selected, capture and tracking of the LOC beam are carried out with the pitch axis remaining in the established mode. If automatic capture and tracking of the GLIDE beam are required, then selection of the GLIDE mode is necessary.

7. Warning and Indicating

A. During cruise flight

AP loss during cruise flight caused by the absence of validity signal or internal monitoring is indicated by the steady red illumination of the warning light marked AP on the warning and landing display indicator associated with an aural warning (cavalry charge). This AP loss involves the extinguishing of the associated green AP indicator light, located on the AFCS control unit.

Inhibition of these aural and visual warnings originated by an automatic disconnection, may be achieved either by depressing one of the AP warning lights on the warning and landing display indicator or one of the AP disconnect push-buttons. Inhibition of the aural warning may be achieved only by pressing the AUDIO CANCEL push-button located on the ceiling panel.

When the AP is disconnected by the pilot (operation of either AP disc push-button on the Captain's or First Officer's control column), the aural warning sounds for one second only. The visual warning is cancelled as previously indicated.

B. During approach :

Both APs being engaged, the loss of one AP is indicated to the pilot by :

- Associated AP green indicator light extinguishing
- Corresponding engage switch disengagement
- Capability reduction (from LAND3 to LAND2) displayed on both warning and landing display indicators.

Loss of both APs is indicated in the same manner as for the loss of one AP in cruise flight ; warning inhibition is achieved as described above.

AUTO PILOT - TROUBLE SHOOTING

WARNING : OBSERVE THE ELECTRICAL SAFETY PRECAUTIONS DESCRIBED IN CHAPTER 24-00-00

1. General

The following trouble shooting procedures are intended to enable faults found in the AP system to be quickly rectified.
The AP system consists of two identical sub-systems or channels. Trouble shooting procedure is described for channel No. 1, trouble shooting procedure for channel No. 2 is indicated between brackets.
The defect can be isolated with the aid of the trouble shooting procedures and traced through OK and NOT OK paths to the appropriate charts or other specified rectification action as may by necessary.

Bracketed numbers in the procedures and charts indicate items on the component identification table (Ref. Table 101). The table provides information, including component location, required for rectification.
All procedures dealing with trouble shooting are based on the assumption that electrical wiring is serviceable, all associated circuit breakers are set and electrical power is available, unless otherwise stated. If the fault is not rectified, check the wiring in accordance with the Wiring Diagram Manual (Ref. Table 101).

2. Prepare

A. Carry out the work preparation required for test of AP system (Ref. 22-10-00, Adjustement/Test, paragraph 3).

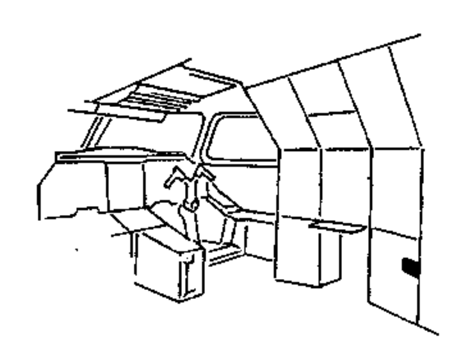
B. Some trouble shooting procedures are carried out by means of the ITEM system TEST UNIT function or IFM function.

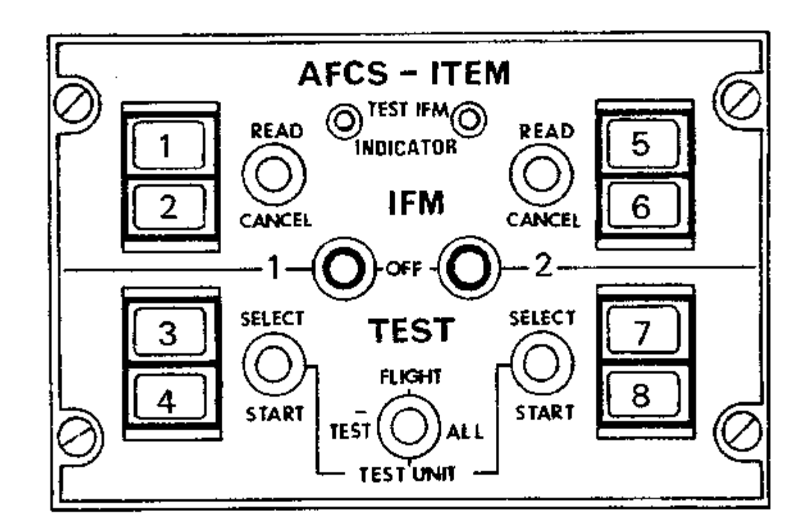
(1) TEST UNIT function (Ref. Fig. 101)

(a) To carry out test of AP/FD azimuth computers, place throttle control levers in max. thrust position, and place AUTOTHROTTLE isolation switches in ON position.

(b) On ITEM Control and Indicator panel.

(b1) Place side 1 (side 2) IFM-OFF-TEST selector switch in TEST position to check computer associated with channel No. 1 (No. 2)





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ITEM Control and Indicator Panel
Figure 101

(b2) Place FLIGHT-TEST ALL-TEST UNIT selector switch in TEST UNIT position.

(b3) After ITEM automatic test, ITEM and PASS must appear in windows 3 and 4 respectively (or 7 and 8 for side 2)

(b4) Hold side 1 (side 2) SELECT-START switch in SELECT position then release it when the display associated with the component being tested (AP. P - AP/FD pitch computer - AP. A - AP/FD azimuth computer) appears in window 3 (7).

(b5) Hold SELECT - START switch in START position to initiate test of selected component, then release it.

(b6) At the end of test (duration depends on component being tested).
PASS indication appears in window 4 (8) and the display associated with the component being tested remains visible in window 3 (7).

NOTE : If test is ineffective COMP or LAND indication will appear in lieu of PASS indication.

(b7) Place all switches in OFF position.

(2) IFM function

(a) In order to simulate in-flight condition, trip circuit breakers G296 and G291 respectively on panels 3-213 and 1-213, map ref. D8 and M16.

(b) On ITEM control and indicator panel :

(b1) Place side 1 (side 2) IFM-OFF-TEST selector switch in IFM position
to check computer associated with channel No. 1 (No. 2)

(b2) Place FLIGHT-TEST ALL-TEST UNIT selector switch in FLIGHT position

(b3) During ITEM automatic test, ITEM indication must appear.

(b4) When ITEM indication does not appear any longer, check that all failures of previous

flight have been cancelled :
hold READ-CANCEL switch in READ position and check that no indication appears in windows 1 and 2 (5 and 6).
Otherwise, place READ- CANCEL switch in CANCEL position to cancel all remaining indications ; then, place READ-CANCEL switch in READ position to display the stored indications, if any, which will be cancelled by placing switch in CANCEL position.

NOTE : When IFM function is no longer used, reset circuit breakers G296 and G291, otherwise TEST UNIT function is inhibited.

3. Autopilot Trouble Shooting

```
****************************************************
* Prepare system for trouble shooting, as described *
* in paragraph 2.                                   *
* On LH side console, hold LIGHTS LO-HI-TEST hold   *
* to-test switch in TEST position.                  *
* On AFCS control unit [1], check that :            *
* All mode selection push-buttons illuminate (if    *
* MAX OP SOFT push button remains extinguished,     *
* press to illuminate).                             *
* All prime indicator lights illuminate.            *
* AP1 caption light illuminates (both bulbs).       *
* On Captain's instrument panel, other lights       *
* illuminate. IF                                    *
****************************************************
   ||    |
   ||    |    -----------------------------------------------
   ||    |    | No light illuminates                          |
  OK   NOT OK----| (Ref. 33-14-00 Trouble Shooting).          |
   ||         | On test of lights, all lights do not illuminate|
   ||         | on Captain's side. Refer Chart 101.           |
   ||         -----------------------------------------------
------------------------------------------------------
| On RH side console, hold LIGHTS-LO-HI-TEST hold-    |
| to-test switch in TEST position.                    |
| On AFCS control unit [1], check that :              |
| All mode selection push-buttons illuminate          |
| (if MAX OP SOFT push-button remains extinguished,   |
| press to illuminate).                               |
| All prime indicator lights illuminate.              |
| AP2 caption light illuminates (both bulbs).         |
| On First Officer's instrument panel, other lights   |
| illuminate. IF                                      |
------------------------------------------------------
   ||    |
   ||    |    -----------------------------------------------
   ||    |    | No light illuminates.                         |
   ||    |    | (Ref. 33-14-00 Trouble Shooting).             |
  OK   NOT OK----| On test of lights, all lights do not illuminate|
   ||         | on First Officer's side. Ref. Chart 102.      |
   ||         -----------------------------------------------
   ||
   ||
   ||
```

```
*****************************************************
* On AFCS control unit [1],                         *
* engage switches FD1 and AP1 (AP2 and FD2).        *
* Both switches remain engaged. IF                  *
*****************************************************
    ||    |
    ||    |          ------------------------------------------------------
    ||    |          | FD1 (FD2) switch does not engage.                  |
    OK    NOT OK----| Ref. Chart 103.                                    |
    ||    |          ------------------------------------------------------
    ||    |
    ||    |          ------------------------------------------------------
    ||    NOT OK----| AP1 (AP2) switch does not engage.                  |
    ||    |          | Ref. Chart 104.                                    |
    ||    |          ------------------------------------------------------
    ||    |
    ||    |          ------------------------------------------------------
    ||    |          | AP1 and FD1 (AP2 and FD2) switches do not          |
    ||    NOT OK----| engage.                                            |
    ||               | Ref. Chart 105.                                    |
    ||               ------------------------------------------------------
*****************************************************
* Disengage AP1 and FD1 (AP2 and FD2) switches.     *
* Cancel AP warnings. Engage side 1 (side 2) ITEM   *
* system in TEST UNIT function. Select AP.P and     *
* start AP/FD pitch computer test (Ref. par. 2, Pre-*
* pare). On completion of test, indications are :   *
* AP.P - PASS. IF                                   *
*****************************************************
    ||    |
    ||    |          ------------------------------------------------------
    OK    NOT OK----| Displays are : AP.P COMP or AP.P. LAND              |
    ||               | Replace AP/FD pitch computer No.1 [2] (No.2 [5]|
    ||               ------------------------------------------------------
    ||
-----------------------------------------------------
| Engage side 1 (side 2) ITEM system in TEST UNIT   |
| function. Select AP.A indication and start AP/FD  |
| azimuth computer test (Ref. par.2, Prepare).      |
| On completion of test, displays are :             |
| AP.A - PASS                                       |
-----------------------------------------------------
    ||    |
    ||    |          ------------------------------------------------------
    ||    |          | Displays are : AP.A - COMP or AP.A - LAND.         |
    OK    |NOT OK---| Replace AP/FD azimuth computer No.1 [3]            |
    ||               | (No.2 [6]).                                        |
    ||               ------------------------------------------------------
```

```
   ||
*****************************************************
* ON AFCS control unit [1], engage AP1 (AP2) switch.*
* PITCH HOLD and HDG HOLD mode selection push      *
* buttons illuminate (2 bulbs). IF                 *
*****************************************************
   ||    |         --------------------------------------------------
   ||    |         | PITCH HOLD mode selection push-button remains   |
   OK    |-NOT OK--| extinguished.                                   |
   ||    |         | Replace AP/FD pitch computer No.1 [2]           |
   ||    |         | (No.2 [5]).                                     |
   ||    |         --------------------------------------------------
   ||    |         --------------------------------------------------
   ||    |         | HDG HOLD mode selection push-button remains     |
   ||    |         | extinguished.                                   |
   ||    |         | Replace AP/FD azimuth computer No.1 [3]         |
   ||    |-NOT OK--| (No.2 [6]).                                     |
   ||    |         | Engage AP1 (AP2) switch.                        |
   ||    |         | If fault remains, replace AP/FD pitch computer  |
   ||    |         | No.1 [2] (No.2 [5]).                            |
   ||    |         --------------------------------------------------
   ||    |         --------------------------------------------------
   ||    |         | RH (LH) lamps of PITCH HOLD and HDG HOLD        |
   ||    |-NOT OK--| mode selection push-buttons are extinguished.   |
   ||    |         | Replace AP/FD pitch computer No.1 [2]           |
   ||    |         | (No.2 [5]).                                     |
   ||    |         --------------------------------------------------
   ||    |         --------------------------------------------------
   ||    |         | RH (LH) lamp of PITCH HOLD mode selection       |
   ||    |-NOT OK--| push-button is extinguished.                    |
   ||    |         | Replace AP/FD pitch computer No.2 [5]           |
   ||    |         | (No.1 [2]).                                     |
   ||    |         --------------------------------------------------
   ||    |         --------------------------------------------------
   ||    |         | RH (LH) lamp of HDG HOLD mode selection         |
   ||    |-NOT OK--| push-button is extinguished.                    |
   ||    |         | Replace AP/FD azimuth computer No.2 [6]         |
   ||    |         | (No.1 [3]).                                     |
   ||    |         --------------------------------------------------
   ||    |         --------------------------------------------------
   ||    |         | LH (RH) lamp of PITCH HOLD mode selection       |
   ||    |-NOT OK--| push-button is extinguished.                    |
   ||    |         | Replace AP/FD pitch computer No.1 [2]           |
   ||    |         | (No.2 [5]).                                     |
   ||    |         --------------------------------------------------
```

```
 ||    |     ------------------------------------------------
 ||    |    | LH (RH) lamp of HDG HOLD mode selection       |
 ||    |    | push-button is extinguished.                  |
 ||    |-NOT OK--| Replace AP/FD azimuth computer No.1 [3]  |
 ||    |    | (No.2 [6]). Re-engage AP1 (AP2)               |
 ||    |    | If fault remains, replace AP/FD pitch computer |
 ||    |    | No.1 [2] (No.2 [5]).                          |
 ||          ------------------------------------------------
*****************************************************
* Disengage ELECTRIC TRIM switch No.2.              *
* On AFCS datum adjust unit [44], successively hold *
* AUTOPILOT NOSE UP-NOSE DOWN toggle switch in the  *
* four positions : (slow) UP, (slow) DOWN, (fast)   *
* UP, (fast) DOWN                                   *
* Check that trim handwheel, control column, and    *
* elevons move accordingly in the four positions. IF*
*****************************************************
 ||    |
 ||    |     ------------------------------------------------
 ||    |    | AUTOPILOT NOSE UP-NOSE DOWN toggle switch not |
 ||    |    | operative.                                    |
 ||    |    | Disengage AP1 (AP2) switch.                   |
 ||    |    | Hold NOSE UP-NOSE DOWN toggle switch in (slow) |
 OK    |-NOT OK--| UP position, for instance. Engage AP1 (AP2) |
 ||    |    | switch.                                       |
 ||    |    | If AP1 (AP2) engages, replace AFCS datum adjust|
 ||    |    | unit [44]                                     |
 ||    |    | If AP1 (AP2) does not engage, replace AP/FD   |
 ||    |    | pitch computer No.1 [2] (No.2 [5]).           |
 ||    |     ------------------------------------------------
 ||    |
 ||    |     ------------------------------------------------
 ||    |    | AUTOPILOT NOSE UP-NOSE DOWN toggle switch     |
 ||    |-NOT OK--| not operative in one of the four positions |
 ||    |    | Ref. Chart 106                                |
 ||    |     ------------------------------------------------
 ||    |
 ||    |     ------------------------------------------------
 ||    |-NOT OK--| AP1 (AP2) switch disengages. Ref. Chart 107. |
 ||    |     ------------------------------------------------
 ||    |     ------------------------------------------------
 ||    |    | ELECTRIC TRIM switch No.1 disengages.         |
 ||    |-NOT OK--| Ref. 20-23-00, Trouble Shooting.          |
 ||    |     ------------------------------------------------
 ||    |
 ||    |     ------------------------------------------------
 ||    |    | Trim handwheel does not rotate.               |
 ||    |-NOT OK--| Ref. 27-39-00, Trouble Shooting.          |
 ||          ------------------------------------------------
```

```
    ||
****************************************************
* Disengage ELECTRIC TRIM switch No.1 and engage    *
* ELECTRIC TRIM switch No.2. Repeat check of        *
* AUTOPILOT NOSE UP-NOSE DOWN toggle switch. Results*
* must be identical with trim No.2 engaged. IF      *
****************************************************
    ||    |
    ||    |         ------------------------------------------------
    OK    |-NOT OK--| ELECTRIC TRIM switch No.2 disengages.         |
    ||    |         | Ref. 22-23-00, Trouble Shooting.              |
    ||    |         ------------------------------------------------
    ||    |         ------------------------------------------------
    ||    |         | Trim handwheel does not rotate.               |
    ||    |-NOT OK--| Ref. 27-39-00, Trouble Shooting.              |
    ||              ------------------------------------------------
    ||
****************************************************
* Engage ELECTRIC TRIM switch No.1.                 *
* On AFCS datum adjust unit [44], rotate TURN knob  *
* to the right, then, to the left.                  *
* Handwheel and elevons deflect as for a right turn,*
* then for a left turn. IF                          *
****************************************************
    ||    |
    ||    |         ------------------------------------------------
    ||    |         | TURN knob inoperative.                        |
    OK    |-NOT OK--| Disengage AP1 (AP2) switch, rotate TURN knob  |
    ||    |         | to the right, for instance. Press AP1 (AP2)   |
    ||    |         | switch.                                       |
    ||    |         | If AP1 (AP2) switch engages, replace AFCS     |
    ||    |         | datum adjust unit [44].                       |
    ||    |         | If AP1 (AP2) switch disengages, replace AP/FD |
    ||    |         | azimuth computer No.1 [3] (No.2 [6]).         |
    ||    |         ------------------------------------------------
    ||    |         ------------------------------------------------
    ||    |-NOT OK--| AP1 (AP2) switch disengages. Ref. Chart 108.  |
    ||              ------------------------------------------------
****************************************************
* Disengage AP1 (AP2) switch and cancel AP warnings.*
* Carry out operations described in 22-10-00, A/T,  *
* par. 3I (1) (a) and (b) (3I (2) (a) and (b)).     *
* Handwheel rotates to the right. IF                *
****************************************************
    ||    |         ------------------------------------------------
    ||    |         | Handwheel does not rotate. Replace AP/FD      |
    ||    |-NOT OK--| azimuth computer No.1 [3] (No.2 [6]). Repeat  |
    ||              | operation. If handwheel does not rotate replace|
    ||              | COMPASS COUPLER unit No.1 [57] (No.2 [58].    |
    ||              ------------------------------------------------
```

```
   ||
****************************************************
* On Captain's control column, press then release  *
* AP DISC switch [8].                              *
* AP1 (AP2) switch disengages.                     *
* On both W & LD indicators [32] and [33], red     *
* AP warning lights illuminate.                    *
* Cavalry charge aural warning sounds during       *
* one second. IF                                   *
****************************************************
   ||    |
   ||    |          ------------------------------------------------
   OK    |-NOT OK--| Captain's AP DISC switch [8] inoperative.      |
   ||    |         | Ref. Chart 109.                                |
   ||    |          ------------------------------------------------
   ||    |
   ||    |          ------------------------------------------------
   ||    |         | AP1 (AP2) switch disengages, but no aural      |
   ||    |-NOT OK--| and/or visual warning.                         |
   ||              | Ref. 22-41-00, Trouble Shooting.               |
   ||               ------------------------------------------------
   ||
****************************************************
* On First Officer's control column, press then    *
* release AP DISC switch [9].                      *
* On both W & LD indicators [32] and [33], AP red  *
* warning lights extinguish. IF                    *
****************************************************
   ||    |
   ||    |          ------------------------------------------------
   ||    |         | Both AP red warning lights remain illuminated. |
   ||    |         | Press Captain's AP DISC switch [8]             |
   OK    |-NOT OK--| If both AP red warning lights extinguish,      |
   ||    |         | replace First Officer's AP DISC switch [9].    |
   ||    |         | If only one lamp of each AP red warning light  |
   ||    |         | extinguishes, ref. 22-41-00, Trouble Shooting. |
   ||    |          ------------------------------------------------
   ||    |
   ||    |
   ||    |          ------------------------------------------------
   ||    |         | Only one lamp of each AP red warning light     |
   ||    |-NOT OK--| extinguishes.                                  |
   ||              | Ref. 22-41-00, Trouble Shooting.               |
   ||               ------------------------------------------------
   ||
   ||
```

```
   ||
*****************************************************
* Engage AP1 (AP2) switch                           *
* On First Officer's control column, press then     *
* release AP DISC switch [9].                       *
* AP1 (AP2) switch disengages.                      *
* On both W & LD indicators [32] and [33],          *
* AP red warning light illuminates.                 *
* Cavalry charge aural warning sounds during        *
* one second. IF                                    *
*****************************************************
   ||    |
   ||    |        -----------------------------------------------------
   OK    |-NOT OK--| First Officer's AP DISC switch inoperative [9] |
   ||    |         | Ref. Chart 110.                                |
   ||    |        -----------------------------------------------------
   ||    |
   ||    |        -----------------------------------------------------
   ||    |         | AP1 (AP2) switch disengages, but no visual     |
   ||    |-NOT OK--| and/or aural warning.                          |
   ||              | Ref. 22-41-00, Trouble Shooting.               |
   ||             -----------------------------------------------------
   ||
*****************************************************
* On Captain's control column, press then release   *
* AP DISC switch [8].                               *
* On both W & LD indicators [32] and [33], AP red   *
* warning light must extinguish. IF                 *
*****************************************************
   ||    |
   ||    |        -----------------------------------------------------
   ||    |         | Both AP red warning lights remain illuminated. |
   OK    |-NOT OK--| Press First Officer's AP DISC switch [9].      |
   ||    |         | If both AP warning lights extinguish, replace  |
   ||    |         | Captain's AP DISC switch [8].                  |
   ||    |         | If only one lamp extinguishes on each AP       |
   ||    |         | warning light, ref. 22-41-00, Trouble Shooting.|
   ||    |        -----------------------------------------------------
   ||    |
   ||    |        -----------------------------------------------------
   ||    |         | Only one lamp extinguishes on each AP warning  |
   ||    |-NOT OK--| light.                                         |
   ||              | Ref. 22-41-00, Trouble Shooting.               |
   ||             -----------------------------------------------------
```

```
*****************************************************
* On Captain's and on First Officer's instrument    *
* panels, place both FD/FD2 switches [45] and [46]  *
* in position FD1.                                   *
* On each ADI [27] and [28] :                        *
* - Flag FD disappears                               *
* - FD1 appears on annunciator. IF                   *
*****************************************************
    ||     |
    ||     |
    ||     |            ------------------------------------------------
    OK     |-NOT OK--| On each ADI, FD flag is visible.                  |
    ||     |         | Replace AP/FD azimuth computer No.1 [3].          |
    ||     |            ------------------------------------------------
    ||     |
    ||     |            ------------------------------------------------
    ||     |         | On Captain's ADI [27], FD flag is visible         |
    ||     |-NOT OK--| Ref. Chart 111.                                   |
    ||     |            ------------------------------------------------
    ||     |
    ||     |            ------------------------------------------------
    ||     |         | On First Officer's ADI [28], FD flag is visible|
    ||     |-NOT OK--| Ref. Chart 112.                                   |
    ||     |            ------------------------------------------------
    ||     |
    ||     |            ------------------------------------------------
    ||     |         | On Captain's ADI [27], FD1 indication             |
    ||     |-NOT OK--| does not appear.                                  |
    ||     |         | Ref. Chart 113.                                   |
    ||     |            ------------------------------------------------
    ||     |
    ||     |            ------------------------------------------------
    ||     |         | On First Officer's ADI [28], FD1 indication       |
    ||     |-NOT OK--| does not appear.                                  |
    ||     |         | Ref. Chart 114.                                   |
    ||                  ------------------------------------------------
```

```
*****************************************************
* On Captain's and on First Officer's instrument    *
* panels, place FD1/FD2 switches [45] and [46]      *
* in FD2 position.                                  *
* On each ADI [27], [28] :                          *
* FD flap is not visible                            *
* FD2 indication appears on annunciator.            *
*****************************************************
    ||   |
    ||   |
    ||   |         ----------------------------------------------------
    OK   |-NOT OK--| On each ADI, FD flag is visible                  |
    ||   |         | Replace AP/FD azimuth computer No.2 [6].         |
    ||   |         ----------------------------------------------------
    ||   |
    ||   |         ----------------------------------------------------
    ||   |-NOT OK--| On Captain's ADI [27], FD flag is visible.       |
    ||   |         | Ref. Chart 115.                                  |
    ||   |         ----------------------------------------------------
    ||   |
    ||   |         ----------------------------------------------------
    ||   |         | On First Officer's ADI [28], FD flag is visible|
    ||   |-NOT OK--| Ref. Chart 116.                                  |
    ||   |         ----------------------------------------------------
    ||   |
    ||   |         ----------------------------------------------------
    ||   |         | On Captain's ADI [27], FD2 indication            |
    ||   |-NOT OK--| does not appear.                                 |
    ||   |         | Ref. Chart 117.                                  |
    ||   |         ----------------------------------------------------
    ||   |
    ||   |         ----------------------------------------------------
    ||   |         | On First Officer's ADI [28], FD2 indication      |
    ||   |-NOT OK--| does not appear.                                 |
    ||   |         | Ref. Chart 118.                                  |
    ||             ----------------------------------------------------
```

```
*****************************************************
* On AFCS control unit [1], engage FD1 (FD2) switch *
* and place Captain's and First Officer's FD1/FD2   *
* switches in FD1 (FD2) position.                   *
* PITCH HOLD mode selection push-button illuminates *
* (both lamps)                                      *
* On both ADIs', the pitch bar is centred. IF       *
*****************************************************
   ||     |
   ||     |        -------------------------------------------------
   OK     |-NOT OK--| PITCH HOLD mode selection push-button does not |
   ||     |         | illuminate.                                    |
   ||     |         | Replace AP/FD azimuth computer No.1 [3]        |
   ||     |         | (No.2 [6]).                                    |
   ||     |        -------------------------------------------------
   ||     |        -------------------------------------------------
   ||     |         | PITCH HOLD mode selection push-button does not |
   ||     |         | illuminate on LH (RH) side and pitch bars are  |
   ||     |-NOT OK--| removed                                        |
   ||     |         | Replace AP/FD azimuth computer No.1 [3]        |
   ||     |         | (No.2 [6]).                                    |
   ||     |        -------------------------------------------------
   ||     |        -------------------------------------------------
   ||     |         | PITCH HOLD mode selection push-button does not |
   ||     |         | illuminate on LH (RH) side, and pitch bars     |
   ||     |-NOT OK--| are centred.                                   |
   ||     |         | Replace AP/FD pitch computer No.1 [2]          |
   ||     |         | (No.2 [5]).                                    |
   ||     |        -------------------------------------------------
   ||     |        -------------------------------------------------
   ||     |         | PITCH HOLD mode selection push-button does not |
   ||     |         | illuminate on RH (LH) side.                    |
   ||     |         | Replace AP/FD pitch computer No.2 [5]          |
   ||     |-NOT OK--| (No.1 [2]). Repeat check.                      |
   ||     |         | If PITCH HOLD push-button RH (LH) side does not|
   ||     |         | illuminate, replace AP/FD azimuth computer     |
   ||     |         | No.1 [3] (No.2 [6]).                           |
   ||     |        -------------------------------------------------
   ||     |        -------------------------------------------------
   ||     |         | PITCH HOLD mode selection push-button is       |
   ||     |         | illuminated, but pitch bars are removed.       |
   ||     |-NOT OK--| Replace W & LD computer No.1 [34] (No.2 [35])  |
   ||     |         | If pitch bars are still removed, replace       |
   ||     |         | AP/FD pitch computer No.1 [2] (No.2 [5]).      |
   ||     |        -------------------------------------------------
```

-NOT OK-- PITCH HOLD mode selection push-button is illuminated and, on Captain's ADI, the pitch bar is removed.
Ref. Chart 119.

-NOT OK-- PITCH HOLD mode selection push-button is illuminated and, on First Officer's ADI, the pitch bar is removed.
Ref. Chart 120.

-NOT OK-- On each ADI, the pitch bar is not centred.
Replace AP/FD pitch computer No.1 [2] (No.2 [5]).

-NOT OK-- On Captain's ADI, the pitch bar is not centred
Ref. Chart 121.

-NOT OK-- On First Officer's ADI, the pitch bar is not centred.
Ref. Chart 122.

```
   ||
****************************************************
* On AFCS control unit, successively select modes,  *
* except HDG HOLD, TURB, GLIDE, and LAND modes.     *
* On selecting a mode, check that associated mode   *
* selection push-button or prime indicator light    *
* illuminates (2 lamps).                            *
* A more accurate procedure is described in 22-10-00*
* Adjustment/Test, par. 2.I. IF                     *
****************************************************
   ||     |
   ||     |         ------------------------------------------------
   ||     |         | LH side lamp of mode selection push-button or |
   ||     |         | prime indicator light does not illuminate.    |
   ||     |         |                                               |
   ||     |         | For modes : HDG/TRK, INS, and VOR/LOC prime   |
   OK     |-NOT OK--| indicator light, replace AP/FD azimuth        |
   ||     |         | computer No.1 [3].                            |
   ||     |         |                                               |
   ||     |         | For modes : IAS HOLD, MACH HOLD, MAX OP, MAX  |
   ||     |         | OP SOFT, PITCH HOLD, ALT HOLD, VERT SPEED, and|
   ||     |         | ALT ACQ prime indicator light replace AP/FD   |
   ||     |         | pitch computer No.1 [2].                      |
   ||     |         |                                               |
   ||     |         | Repeat check of mode selection.               |
   ||     |         | If fault remains, replace AFCS control unit.  |
   ||     |         ------------------------------------------------
   ||     |
   ||     |         ------------------------------------------------
   ||     |         | RH side lamp of mode selection push-button or |
   ||     |         | prime indicator light does not illuminate.    |
   ||     |         |                                               |
   ||     |         | For modes : HDG/TRK, INS, and VOR/LOC prime   |
   ||     |         | indicator light, replace AP/FD azimuth        |
   ||     |-NOT OK--| computer No.2 [6].                            |
   ||               |                                               |
   ||               | For modes : IAS HOLD, MACH HOLD, MAX OP, MAX  |
   ||               | OP SOFT, PITCH HOLD, ALT HOLD, VERT SPEED, and|
   ||               | ALT ACQ prime indicator light, replace AP/FD  |
   ||               | pitch computer No.2 [5].                      |
   ||               |                                               |
   ||               | Repeat check of mode selection.               |
   ||               | If fault remains, replace AFCS control unit.  |
   ||               ------------------------------------------------
   ||
```

```
   ||
*****************************************************
* Place both RAD/INS switches in RAD position       *
* On AFCS control unit, pull both HDG-TRK push-     *
* pull knobs and select on counters the heading     *
* shown on both HSIs' :                             *
* -HDG indication is visible                        *
* -The HDG pointer shows the aircraft heading. IF   *
*****************************************************
   ||    |
   ||    |         --------------------------------------------------
   OK    |-NOT OK--| On Captain's HSI, HDG indication is not visible|
   ||    |         | Ref. Chart 123.                                 |
   ||    |         --------------------------------------------------
   ||    |
   ||    |         --------------------------------------------------
   ||    |         | On First Officer's HSI, HDG indication          |
   ||    |-NOT OK--| is not visible.                                 |
   ||    |         | Ref. Chart 124.                                 |
   ||    |         --------------------------------------------------
   ||    |
   ||    |         --------------------------------------------------
   ||    |         | The heading pointer does not move in accordance|
   ||    |-NOT OK--| with selection on any HSI.                      |
   ||              | Ref. 34-23-00, Trouble Shooting.                |
   ||              --------------------------------------------------
```

```
****************************************************
* Select HDG/TRK mode.                             *
* -FD1 (FD2) switch remains engaged.               *
* -HDG/TRK mode selection push-button illuminates. *
* -On each ADI, the roll bar is centred. IF        *
****************************************************
   ||    |
   ||    |         ------------------------------------------------
   OK    |-NOT OK--| FD1 (FD2) switch disengages                  |
   ||    |         | Ref. Chart 125.                              |
   ||    |         ------------------------------------------------
   ||    |         ------------------------------------------------
   ||    |         | The two roll bars are out-of-view            |
   ||    |         | Replace AP/FD azimuth computer No.1 [3]      |
   ||    |-NOT OK--| (No.2 [6]).                                  |
   ||    |         | Repeat check.                                |
   ||    |         | If fault remains, replace W & LD computer No.1 |
   ||    |         | [34] (No.2 [35]).                            |
   ||    |         ------------------------------------------------
   ||    |         ------------------------------------------------
   ||    |-NOT OK--| On Captain's ADI, the roll bar is out-of-view |
   ||    |         | Ref. Chart 126.                              |
   ||    |         ------------------------------------------------
   ||    |         ------------------------------------------------
   ||    |-NOT OK--|On First Officer's ADI, the roll bar is out-of |
   ||    |         | view. Ref. Chart 127.                        |
   ||    |         ------------------------------------------------
   ||    |         ------------------------------------------------
   ||    |         | On each ADI, the roll bar is not centred.    |
   ||    |-NOT OK--| Replace AP/FD azimuth computer No.1 [3]      |
   ||    |         | (No.2 [6]).                                  |
   ||    |         ------------------------------------------------
   ||    |         ------------------------------------------------
   ||    |-NOT OK--| On Captain's ADI, the roll bar is not centred |
   ||    |         | Ref. Chart 128.                              |
   ||    |         ------------------------------------------------
   ||    |         ------------------------------------------------
   ||    |         | On First Officer's ADI, the roll bar is not  |
   ||    |-NOT OK--| centred.                                     |
   ||              | Ref. Chart 129.                              |
   ||              ------------------------------------------------
```

```
*****************************************************
* On AFCS control unit [1], slightly rotate HDG-TRK1*
* (HDG-TRK2) push-pull knob clockwise, then,        *
* counterclockwise.                                 *
* On each ADI, the roll bar must move to the        *
* right, then, to the left.                         *
*****************************************************
    ||    |
    ||    |        ---------------------------------------------------
    OK    |-NOT OK--| The roll bars do not move                       |
    ||              | Ref. Chart 130.                                 |
    ||             ---------------------------------------------------
    ||
*****************************************************
* Disengage FD1 (FD2) switch.                       *
* On AFCS control unit, push both HDG-TRK push-     *
* pull knobs                                        *
* On both HSIs, TRK indication is visible. IF       *
*****************************************************
    ||    |
    ||    |        ---------------------------------------------------
    ||    |         | On either HDI :                                 |
    OK    |-NOT OK--| TRK indication does not appear.                 |
    ||    |         | The drift pointer is visible.                   |
    ||    |         | Ref. 34-23-00, Trouble Shooting.                |
    ||    |        ---------------------------------------------------
    ||    |
    ||    |        ---------------------------------------------------
    ||    |         | On either HSI :                                 |
    ||    |         | TRK indication does not appear.                 |
    ||    |-NOT OK--| The drift pointer is out-of-view                |
    ||              | NAV flag is visible.                            |
    ||              | Ref. 34-23-00, Troubel Shooting.                |
    ||             ---------------------------------------------------
    ||
```

```
**************************************************
* Generate a drift signal. Ref. 22-10-00 Adjustment/*
* Test, par. 3.J (3) (c) to 3.J (4) (c)           *
* Engage FD1 (FD2) switch                          *
* Select HDG/TRK mode.                             *
* On each ADI, the roll bar is not centred.        *
**************************************************
   ||    |
   ||    |   ------------------------------------------------
   OK    |-NOT OK--| On each ADI, the roll bar remains centred.  |
   ||              | Replace Track Heading unit No.1 [53].       |
   ||              | (No.2 [54]).                                |
   ||                ------------------------------------------------
   ||
   ||
   ||
**************************************************
* On Captain's (First Officer's) HSI, press TEST   *
* push-button                                      *
* FD1 (FD2) disengages. IF                         *
**************************************************
   ||    |
   ||    |
   ||    |   ------------------------------------------------
   OK    |-NOT OK--| FD1 (FD2) switch remains engaged.           |
   ||              | Ref. Chart 131.                             |
   ||                ------------------------------------------------
   ||
   ||
**************************************************
* Engage AP1 (AP2) switch.                         *
* Select HDG/TRK mode.                             *
* HDG/TRK mode selection push-button illuminates.  *
* On AFCS datum adjust unit [44], rotate TURN knob. *
* - HDG/TRK mode selection push-button extinguishes.*
* - HDG/HOLD mode selection push-button illuminates.*
* IF                                               *
**************************************************
   ||    |
   ||    |   ------------------------------------------------
   ||    |   | HDG/TRK mode selection push-button remains    |
   OK    |-NOT OK--| illuminated, HDG HOLD mode selection push-  |
   ||              | button remains extinguished.                |
   ||              | Replace AP/FD azimuth computer No.1 [3]     |
   ||              | No.2 [6]).                                  |
   ||                ------------------------------------------------
```

```
****************************************************
* Disengage AP1 (AP2) switch, and cancel AP warnings*
* Place Captain's (First Officer's) RAD/INS switch  *
* in INS position.                                  *
* Generate an INS steering signal. Ref, 22-10-00,   *
* Adjustment/Test, par. 3K (1) (c) (3K (2) (c))     *
* Engage FD1 (FD2) switch and select INS mode.      *
* FD1 (FD2) engages in INS mode.                    *
* On each ADI, the roll bar must move. IF           *
****************************************************
   ||    |
   ||    |
   ||    |         ------------------------------------------------------
   ||    |         | FD1 (FD2) switch disengages.                        |
   OK    |-NOT OK--| Ref. Chart 132.                                     |
   ||    |         ------------------------------------------------------
   ||    |
   ||    |         ------------------------------------------------------
   ||    |         | The roll bars are not moving.                       |
   ||    |-NOT OK--| Ref, Chart 133.                                     |
   ||              ------------------------------------------------------
```

```
   ||
*****************************************************
* Disengage FD1 (FD2) switch                        *
* Place Captain's (Frist Officer's) RAD/INS switch  *
* in RAD position.                                  *
* On VOR-ILS-DME No.1 (No.2) control unit, display  *
* the VOR test unit VOR frequency.                  *
* On AFCS control unit, by means of VOR-LOC1        *
* (VOR-LOC2) push-pull knob, select a VOR track     *
* 30 degrees to the right of aircraft heading.      *
* By means of the ground test unit, simulate an     *
* aircraft deviation to the right of beam           *
* (deviation preventing capture)                    *
* Engage FD1 (FD2) switch and select HDG/TRK mode.  *
* -HDG/TRK mode selection push-button illuminates.  *
*                                                   *
* On each ADI, the roll bar is centred.             *
*                                                   *
* Select VOR/LOC mode (VOR/LOC prime indicator light*
* illuminates).                                     *
* Gradually decrease VOR deviation until capture    *
* phase is initiated :                              *
* -VOR/LOC prime indicator light and HDG/TRK mode   *
*  selection push-button extinguish.                *
* -VOR/LOC mode selection push-button illuminates.  *
* -On each ADI, the roll bar moves to the left.     *
* -Cancel VOR deviation.                            *
* -On each ADI, the roll bar is centred. IF         *
*****************************************************
    ||    |         ---------------------------------------------
    ||    |        | VOR/LOC mode selection push-button does not |
    ||    |        | illuminate.                                 |
    OK    |-NOT OK--| HDG/TRK mode selection push-button and VOR/LOC |
    ||    |        | prime indicator light remain illuminated.   |
    ||    |        | Ref. Chart 134.                             |
    ||    |         ---------------------------------------------
    ||    |
    ||    |         ---------------------------------------------
    ||    |        | The roll bars do not move, or, are not centred.|
    ||    |-NOT OK--| Replace AP/FD azimuth computer No.1 [3]     |
    ||    |        | (No.2 [6]).                                 |
    ||    |         ---------------------------------------------
    ||    |
    ||    |
```

```
    ||    |
    ||    |          -------------------------------------------------
    ||    |          | Error in mode signal logic sequence :         |
    ||    |          | (On illumination of VOR/LOC mode selection    |
    ||    |          | push-button, VOR/LOC prime indicator light    |
    ||    |          | and HDG/TRK mode selection push-button must   |
    ||    |          | extinguish).                                  |
    ||    |-NOT OK--| If fault is on LH side of either light,       |
    ||               | replace AP/FD azimuth computer No.1 [3]       |
    ||               | (No.2 [6]).                                   |
    ||               | If fault is on RH side of either light,       |
    ||               | replace AP/FD azimuth computer No.2 [6]       |
    ||               | (No.1 [3])                                    |
    ||               | If fault remains, replace AP/FD azimuth       |
    ||               | computer No.1 [3] (No.2 [6]).                 |
    ||               -------------------------------------------------
    ||
*****************************************************
* Carry out side 1 (side 2) VOR Test.               *
* - VOR Test is inhibited.                          *
* (VOR Test is carried out by means of Captain's    *
* (First Officer's) VOR-ILS-DME control unit.       *
*****************************************************
    ||    |
    ||    |
    ||    |          -------------------------------------------------
    OK    |-NOT OK--| VOR Test is not inhibited.                    |
    ||               | Replace AP/FD azimuth computer No.1 [3]       |
    ||               | (No.2 [6]).                                   |
    ||               -------------------------------------------------
```

```
    ||
*****************************************************
* Engage AP1 (AP2) switch.                          *
* VOR/LOC mode selection push-button extinguishes   *
* PITCH HOLD and HDG HOLD mode selection push-      *
* buttons illuminate.                               *
* Select TURB mode                                  *
* PITCH HOLD and HDG HOLD mode selection push       *
* buttons extinguish.                               *
* TURB mode selection push-button illuminates       *
* FD1 (FD2) switch disengages. IF                   *
*****************************************************
    ||    |
    ||    |         --------------------------------------------------
    ||    |         | FD1 (FD2) switch remains engaged.              |
    OK    |-NOT OK--| Replace AP/FD azimuth computer No.1 [3]        |
    ||    |         | (No.2 [6]).                                    |
    ||    |         --------------------------------------------------
    ||    |
    ||    |         --------------------------------------------------
    ||    |         | One lamp on either side of PITCH HOLD mode     |
    ||    |         | selection push-button does not extinguish.     |
    ||    |-NOT OK--| Replace associated AP/FD pitch computer        |
    ||    |         | (LH side : No.1 [2], RH side : No.2 [5]).      |
    ||    |         | If fault remains, replace associated AP/FD     |
    ||    |         | azimuth computer (No.1 [3], No.2 [6]).         |
    ||    |         --------------------------------------------------
    ||    |
    ||    |         --------------------------------------------------
    ||    |         | One lamp on either side of TURB mode selection |
    ||    |         | push-button does not illuminate.               |
    ||    |-NOT OK--| Replace associated AP/FD azimuth computer      |
    ||              | (No.1 [3], No.2 [6]).                          |
    ||              --------------------------------------------------
```

```
   ||
*****************************************************
* Select PITCH HOLD mode.                           *
* -TURB mode selection push-button extinguishes.    *
* -PITCH HOLD and HDG HOLD mode section push-       *
*  buttons illuminate. IF                           *
*****************************************************
   ||   |
   ||   |          ----------------------------------------------------
   ||   |          | PITCH HOLD mode selection push-button does not |
   OK   |-NOT OK--| illuminate.                                     |
   ||   |          | Replace AP/FD pitch computer No.1 [2]           |
   ||   |          | (No.2 [5]).                                     |
   ||   |          ----------------------------------------------------
   ||   |
   ||   |          ----------------------------------------------------
   ||   |          | HDG HOLD mode selection push-button does not   |
   ||   |-NOT OK--| illuminate.                                     |
   ||   |          | Replace AP/FD azimuth computer No.1 [3]         |
   ||   |          | (No.2 [6].                                      |
   ||   |          ----------------------------------------------------
   ||   |
   ||   |          ----------------------------------------------------
   ||   |          | TURB mode selection push-button remains        |
   ||   |          | illuminated and hdg HOLD mode selection push-  |
   ||   |          | button remains extinguished.                    |
   ||   |-NOT OK--| Replace AP/FD pitch computer No.1 [2]           |
   ||              | No.2 [5])                                       |
   ||              | If fault remains, replace AP/FD azimuth         |
   ||              | computer No.1 (No.2 [6]).                       |
   ||              ----------------------------------------------------
   ||
*****************************************************
* AP1 (AP2) switch being engaged :                  *
* Select IAS HOLD mode                              *
* IAS HOLD mode selection push button illuminates   *
* On AFCS datum adjust unit [44], operate AUTOPILOT *
* NOSE UP-NOSE DOWN toggle switch in either         *
* direction.                                        *
* Elevons deflect. IF                               *
*****************************************************
   ||   |
   ||   |          ----------------------------------------------------
   OK   |-NOT OK--| Elevons do not deflect.                         |
   ||              | Replace AP/FD pitch computer No.1 [2]           |
   ||              | (No.2 [5]).                                     |
   ||              ----------------------------------------------------
   ||
   ||
```

```
***************************************************
* On ADC control panel, place ADC1 (ADC2) selector  *
* switch in NORM position, place ADC2 (ADC1) switch *
* in OFF position.                                  *
* When data is stabilized, re-engage systems        *
* as necessary.                                     *
* Engage AP1 (AP2) switch. Select IAS HOLD mode.    *
* By means of ADC simulator, vary Ias speed         *
* -Elevons deflect. IF                              *
***************************************************
   ||    |         ----------------------------------------
   ||    |         | Elevons do not deflect               |
   OK    |-NOT OK--| Ref. Chart 135.                      |
   ||              ----------------------------------------
   ||
***************************************************
* On AFCS control unit, engage AT1 (AT2) switch.    *
* -On AUTOTHROTTLE section, IAS HOLD mode selection *
* push-button illuminates.                          *
* -On AP/FD section, IAS HOLD mode selection        *
*  push-button extinguishes.                        *
* -PITCH HOLD mode selection push-button illuminates*
*  IF.                                              *
***************************************************
   ||    |         ----------------------------------------
   ||    |         | Error in mode signal logic           |
   ||    |         | Replace Autothrottle computer No.1 [4]|
   OK    |-NOT OK--| (No.2 [7]).                          |
   ||              | Repeat check.                        |
   ||              | If fault remains, replace AP/FD pitch computer |
   ||              | No.1 [2] (No.2 [5]).                 |
   ||              ----------------------------------------
   ||
***************************************************
* On AP/FD section, select IAS HOLD mode.           *
* -IAS HOLD mode selection push-button illuminates. *
* -AT1 (AT2) switch disengages and AT section       *
*  IAS HOLD mode selection push-button extinguishes.*
***************************************************
   ||    |         ----------------------------------------
   ||    |         | No priority of AP/FD system over AT system. |
   ||    |         | Replace Autothrottle computer No.1 [4]|
   OK    |-NOT OK--| (No.2 [7]).                          |
   ||              | Repeat check.                        |
   ||              | If fault remains, replace AP/FD pitch computer |
   ||              | No.1 [2] (No.2 [5]).                 |
   ||              ----------------------------------------
   ||
   ||
```

```
*****************************************************
* On ADC control panel, place ADC1 and ADC2 selector*
* switches in TEST 2 position.                      *
* When data is stabilized, press ADC1 and ADC2      *
* caption lights.                                   *
* Re-engage systems as necessary.                   *
* Engage AP1 (AP2) switch and select MACH HOLD mode.*
* -MACH HOLD mode selection push-button illuminates.*
* On AFCS datum adjust unit [44], operate AUTOPILOT *
* NOSE UP-NOSE DOWN toggle switch in either         *
* direction.                                        *
* -Elevons deflect.                                 *
*****************************************************
   ||    |
   ||    |         --------------------------------------------------
   ||    |         | Elevons do not deflect.                        |
   OK    |-NOT OK--| Replace AP/FD pitch computer No.1 [2]          |
   ||              | (No.2 [5]).                                    |
   ||              --------------------------------------------------
   ||
-----------------------------------------------------
| On ADC control panel, place ADC1 (ADC2) selector  |
| switch in NORM position, place ADC2 (ADC1)        |
| switch in OFF position.                           |
| When data is stabilized, re-engage systems        |
| as necessary.                                     |
| Engage AP1 (AP2) switch, select IAS HOLD mode.    |
| By means of ADC simulator, vary Mach number.      |
| -Elevons deflect.                                 |
-----------------------------------------------------
   ||    |
   ||    |         --------------------------------------------------
   ||    |         | Elevons do not deflect.                        |
   OK    |-NOT OK--| Ref. Table 136.                                |
   ||              --------------------------------------------------
   ||
   ||
   ||
   ||
```

```
****************************************************
* Disengage AP1 (AP2) switch, cancel AP warnings.  *
* By means of ADC simulator, simulate an IAS equal *
* to VMO.                                          *
* Engage FD1 (FD2) switch and select MAX OP mode.  *
* -MAX OP mode selection push-button illuminates.  *
* -On each ADI, the pitch bar is centred. IF       *
****************************************************
   ||    |
   ||    |         ---------------------------------------------------
   ||    |        | The pitch bars are not centred.                   |
   OK    |-NOT OK--| Replace AP/FD pitch computer No.1 [2]            |
   ||             | (No.2 [5]).                                       |
   ||              ---------------------------------------------------
   ||
****************************************************
* On AFCS datum adjust unit [44], operate          *
* AUTOTHROTTLE NOSE UP-NOSE DOWN toggle switch     *
* in either direction.                             *
* On each ADI, the pitch bar moves. IF             *
****************************************************
   ||    |         ---------------------------------------------------
   ||    |        | The pitch bars do not move                        |
   OK    |-NOT OK--| Replace AP/FD pitch computer No.1 [2]            |
   ||             | (No.2 [5]).                                       |
   ||              ---------------------------------------------------
****************************************************
* By means of AUTOTHROTTLE NOSE UP-NOSE DOWN toggle *
* switch, move both ADIs' pitch bars to the centre. *
* Select MAX OP SOFT mode.                          *
* -MAX OP SOFT mode selection push button           *
*  illuminates.                                     *
* On both ADIs, the pitch bars have moved to the    *
* centre. IF                                        *
****************************************************
   ||    |
   ||    |         ---------------------------------------------------
   OK    |-NOT OK--| The pitch bars are not centred.                  |
   ||             | Ref. Chart 137.                                   |
   ||              ---------------------------------------------------
****************************************************
* On panel 13-215 (13-216), trip circuit breaker   *
* 1C181 (2C181), map ref. D 05 (B 17)              *
* On both ADIs, the pitch bar moves upwards. IF    *
****************************************************
   ||    |         ---------------------------------------------------
   OK    |-NOT OK--| The pitch bars are not moving                    |
                  | Ref Chart 137.                                    |
                   ---------------------------------------------------
```

```
*****************************************************
* Reset circuit breaker 1C181 (2C181)               *
* On ADC control panel, place ADC1 and ADC2 selector*
* switches in TEST 1 position.                      *
* When data is stabilized, press ADC1 and ADC2      *
* caption lights, and re-engage systems as necessary*
* Engage AP1 (AP2) switch, select ALT HOLD mode.    *
* -ALT HOLD mode selection push-button illuminates. *
* On AFCS datum adjust unit [44], operate           *
* AUTOTHROTTLE NOSE UP-NOSE DOWN toggle switch in   *
* either direction.                                 *
* -Elevons deflect. IF                              *
*****************************************************
    ||   |
    ||   |         ---------------------------------------------------
    ||   |         | Elevons do not deflect.                         |
    OK   |-NOT OK--| Replace AP/FD pitch computer No.1 [2]           |
    ||             | (No.2 [5]).                                     |
    ||             ---------------------------------------------------
    ||
*****************************************************
* On ADC control panel, place ADC1 (ADC2) selector  *
* switch in NORM position, place ADC2 switch in     *
* OFF position.                                     *
* When data is stabilized, re-engage systems        *
* as necessary.                                     *
* Engage AP1 (AP2) switch, select ALT HOLD mode     *
* By means of ADC simulator, vary altitude          *
* -Elevons deflect. IF                              *
*****************************************************
    ||   |
    ||   |         ---------------------------------------------------
    ||   |         | Elevons do not deflect                          |
    ||   |         | Replace Air Data Computer No.1 [63]             |
    OK   |-NOT OK--| (No.2 [64]).                                    |
    ||             | If fault remains, replace AP/FD pitch computer  |
    ||             | No.1 [2] (No.2 [5]).                            |
    ||             ---------------------------------------------------
    ||
    ||
```

```
*****************************************************
* Disengage AP1 (AP2) switch and cancel AP warnings.*
* On Captain's and on First Officer's instrument    *
* panels, place FD1/FD2 switches in the associated  *
* FD position. Select VERT SPEED mode.              *
* -VERT SPEED mode selection push-button illuminates*
* On Captain's (First Officer's) ADI, the pitch     *
* bar is centred.                                   *
* On First Officer's (Captain's) ADI, the pitch     *
* bar is out-of-view. IF                            *
*****************************************************
   ||    |
   ||    |       --------------------------------------------------
   OK    |-NOT OK--| FD1 (FD2) switch disengages.                  |
   ||    |         | Ref. Chart 138.                               |
   ||    |       --------------------------------------------------
   ||    |
   ||    |       --------------------------------------------------
   ||    |         | On Captain's (First Officer's) ADI,           |
   ||    |-NOT OK--| the pitch bar is not centred.                 |
   ||    |         | Ref. Chart 139.                               |
   ||    |       --------------------------------------------------
   ||    |
   ||    |       --------------------------------------------------
   ||    |         | On First Officer's (Captain's) ADI,           |
   ||    |         | the pitch bar remains visible.                |
   ||    |-NOT OK--| Replace AP/FD pitch computer No.1 [2]         |
   ||              | (No.2 [5]).                                   |
   ||              | If fault remains, replace AP/FD computer No.2 |
   ||              | [5] (No.1 [2]).                               |
   ||            --------------------------------------------------
   ||
```

```
*****************************************************
* On AFCS datum adjust unit [44], operate AUTOPILOT *
* NOSE UP-NOSE DOWN toggle switch in nose up        *
* direction (both positions) then in nose down      *
* direction (both positions)                        *
* - On Captain's (First Officer's) vertical speed   *
*   indicator, the commanded speed pointer moves    *
*   accordingly                                     *
* - On Captain's (First Officer's) ADI, the pitch   *
*   bar moves. IF                                   *
*****************************************************
    ||   |
    ||   |           --------------------------------------------------
    ||   |           | The commanded speed pointer and the pitch bar  |
    OK   |-NOT OK--| do not move.                                    |
    ||   |           | Ref. Chart 140.                                |
    ||   |           --------------------------------------------------
    ||   |
    ||   |           --------------------------------------------------
    ||   |           | In one of the four positions of NOSE UP-NOSE   |
    ||   |-NOT OK--| DOWN toggle switch, the commanded speed         |
    ||   |           | pointer and the pitch bar do not move.         |
    ||   |           | Ref. Chart 141.                                |
    ||   |           --------------------------------------------------
    ||   |
    ||   |           --------------------------------------------------
    ||   |           | The commanded speed pointer moves, and the     |
    ||   |           | pitch bar remains steady.                      |
    ||   |           | Replace AP/FD pitch computer No.1 [2]          |
    ||   |-NOT OK--| (No.2 [5]).                                      |
    ||               | Repeat check.                                  |
    ||               | If fault remains, replace vertical speed       |
    ||               | indicator No.1 [69] (No.2 [70]).               |
    ||               --------------------------------------------------
    ||
    ||
```

```
*****************************************************
* On panel 2-213 (13-216), trip circuit breaker 1F97*
* (2F97), map ref. A3 (B13)                         *
* -FD1 (FD2) switch disengages. IF                  *
*****************************************************
    ||    |
    ||    |          ------------------------------------------------
    OK    |-NOT OK--| FD1 (FD2) switch remains engaged               |
    ||              | Ref. Chart 142.                                |
    ||               ------------------------------------------------
    ||
*****************************************************
* Reset circuit breaker 1F97 (2F97).                *
* On ceiling panel, disengage AUTOSTAB control      *
* unit No.1 and No.2 levers, and ELECTRIC TRIM      *
* switches 1 and 2.                                 *
* On panel 13-215, trip circuit breaker 1C652,      *
* map ref. E6.                                      *
* On panel 13-216, trip circuit breaker 2C652,      *
* map ref. C17.                                     *
* On ceiling panel, on ANTISTALL SYSTEM control     *
* unit, place both ON-OFF switches in OFF position  *
* On ADC control panel, place ADC1 and ADC2 selector*
* switches in TEST1 position. When data is          *
* stabilized press ADC1 and ADC2 caption lights.    *
* Engage AUTOSTAB No.1 (AUTOSTAB No.2) PITCH, ROLL  *
* and YAW levers.                                   *
* Read the altitude displayed on Captain's (First   *
* Officer's) altimeter. Supposing an altitude H ;   *
* on AFCS control unit, display an altitude         *
* H-1500 ft by means of ALTITUDE SELECT selection   *
* switch                                            *
* Engage FD1 (FD2) switch and select ALT ACQ mode   *
* -ALT ACQ prime indicator light illuminates        *
* -PITCH HOLD mode selection push-button            *
*  is illuminated.                                  *
* Display on altitude H by means of the altitude    *
* selector.                                         *
* -ALT HOLD mode selection push-button illuminates. *
* -PITCH HOLD mode selection push-button            *
*  extinguishes.                                    *
*****************************************************
    ||    |
    ||    |          ------------------------------------------------
    ||    |         | ALT HOLD mode selection push-button does not   |
    OK    |-NOT OK--| illuminate.                                    |
    ||              | Ref. Chart 143.                                |
    ||               ------------------------------------------------
```

```
***************************************************
* Make certain that Captain's and First Officer's   *
* RAD/INS switches are in RAD position.             *
* On Captain's (First Officer's) VOR-ILS-DME control*
* unit, display the LOC frequency of ILS ground     *
* test unit.                                        *
* By means of ground test unit, simulate an aircraft*
* LOC beam deviation to the left.                   *
* Engage FD1 (FD2) switch, and select BACK BEAM mode*
* -BACK BEAM mode selection push-button illuminates.*
* -On Captain's (First Officer's) ADI, the roll     *
*  bar moves to the left. IF                        *
***************************************************
   ||    |
   ||    |      ---------------------------------------------------
   ||    |      | The roll bar is out-of-view                      |
   OK    |-NOT OK--| Replace AP/FD azimuth computer No.1 [3]       |
   ||    |      | (No.2 [6]).                                      |
   ||    |      ---------------------------------------------------
   ||    |
   ||    |      ---------------------------------------------------
   ||    |-NOT OK--| The roll bar does not move.                   |
   ||    |      | Ref. Chart 144.                                  |
   ||    |      ---------------------------------------------------
   ||    |
   ||    |      ---------------------------------------------------
   ||    |-NOT OK--| FD1 (FD2) switch disengages.                  |
   ||           | Ref. Chart 145.                                  |
   ||           ---------------------------------------------------
   ||
   ||
```

```
    ||
*****************************************************
* On ADC control panel, place ADC1 and ADC2 selector*
* switches in TEST 2 position.                      *
* When data is stabilized, press ADC1 and ADC2      *
* caption lights.                                   *
* On ceiling panel, on ANTISTALL SYSTEM, place      *
* ON-OFF switches in ON position.                   *
* Engage AUTOSTAB No.1 and AUTOSTAB No.2 PITCH,     *
* ROLL, and YAW levers.                             *
* Connect radio altimeter ground test unit to       *
* Captain's (First Officer's) side and simulate     *
* an altitude of 1500 ft on Captain's (First        *
* Officer's) side.                                  *
* On VOR-ILS-DME control units No.1 and No.2,       *
* display the ILS frequency of ILS ground test unit.*
* By means of ILS ground test unit, simulate an     *
* aircraft deviation to the left of LOC beam and    *
* below GLIDE beam (max. deviation to prevent       *
* capture phase).                                   *
* Engage FD1 (FD2) switch and select ALT HOLD and   *
* HDG/TRK modes                                     *
* Select VOR/LOC mode.                              *
* - VOR/LOC prime indicator light illuminates.      *
*****************************************************
    ||
    ||
    OK
    ||
    ||
-----------------------------------------------------
| Select HDG HOLD mode.                             |
| -VOR/LOC prime indicator light extinguishes.      |
| -HDG/TRK mode selection push-button extinguishes. |
-----------------------------------------------------
    ||    |
    ||    |     ---------------------------------------------------
    ||    |     | VOR/LOC prime indicator light does not          |
    OK    |-NOT OK--| extinguish.                                 |
    ||          | Replace AP/FD azimuth computer No.1 [3]         |
    ||          | (No.2 [6]).                                     |
    ||          ---------------------------------------------------
    ||
```

```
****************************************************
* Select HDG/TRK mode.                             *
* -HDG/TRK mode selection push-button illumiinates. *
* Select GLIDE mode.                               *
* -GLIDE and VOR/LOC prime indicator lights        *
*  illuminate.                                     *
* On each W & LD indicator, check that the aircraft *
* symbol, the RH LOC deviation bar, the upper GLIDE *
* deviation bar are illuminated. IF                *
****************************************************
   ||    |
   ||    |        ----------------------------------------------
   ||    |        |VOR/LOC and GLIDE prime indicator lights     |
   OK    |-NOT OK--|do not illuminate.                           |
   ||    |        | Replace AFCS control unit [1]               |
   ||    |        ----------------------------------------------
   ||    |
   ||    |        ----------------------------------------------
   ||    |        | VOR/LOC prime indicator light is extinguished. |
   ||    |-NOT OK--| Replace AP/FD azimuth computer No.1 [3]     |
   ||    |        | (No.2 [6]).                                 |
   ||    |        ----------------------------------------------
   ||    |
   ||    |        ----------------------------------------------
   ||    |-NOT OK--| GLIDE prime indicator light is extinguished. |
   ||    |        | Replace AP/FD pitch computer No.1 [2]       |
   ||    |        | (No.2 [5]).                                 |
   ||    |        ----------------------------------------------
   ||    |
   ||    |        ----------------------------------------------
   ||    |        | Illumination of excessive beam deviation    |
   ||    |-NOT OK--| bars or aircraft symbol not correct.        |
   ||             | Ref. 22-41-00, Trouble Shooting.            |
   ||             ----------------------------------------------
   ||
****************************************************
* Carry out side 1 (side 2) ILS test.              *
* - ILS test is inhibited. IF                      *
****************************************************
   ||    |
   ||    |        ----------------------------------------------
   OK    |-NOT OK--| ILS test is not inhibited.                  |
   ||             | Replace AP/FD azimuth computer No.1 [3]     |
   ||             | (No.2 [6]).                                 |
   ||             ----------------------------------------------
   ||
```

```
*****************************************************
* Select PITCH HOLD mode                            *
* -PITCH HOLD mode selection push-button illuminates*
* -GLIDE prime indicator light extinguishes.        *
* -On each W & LD indicator, the aircraft symbol    *
*  and the LOC and GLIDE excessive beam deviation   *
*  bars extinguish. IF                              *
*****************************************************
   ||    |
   ||    |         ----------------------------------------------------
   ||    |         | GLIDE prime indicator light remains illuminated|
   OK    |-NOT OK--| Replace AP/FD pitch computer No.1 [2]          |
   ||              | (No.2 [5]).                                    |
   ||              ----------------------------------------------------
   ||
*****************************************************
* Select ALT HOLD, HDG TRK modes then select GLIDE  *
* mode.                                             *
* -ALT HOLD and HDG/TRK mode selection push-buttons *
*  are illuminated                                  *
* -GLIDE and VOR/LOC prime indicator lights are     *
*  illuminated.                                     *
* By means of ILS simulator, decrease LOC deviation *
* until capture phase is initiated.                 *
* -VOR/LOC mode selection push-button illuminates.  *
* -VOR/LOC prime indicator light extinguishes.      *
* -HDG/TRK mode selection push-button extinguishes. *
* -On Captain's (First Officer's) ADI, the roll     *
*  bar moves to the right. IF                       *
*****************************************************
   ||    |
   ||    |         ----------------------------------------------------
   ||    |         | LOC capture is not initiated.                  |
   ||    |         | (VOR/LOC mode selection push-button does not   |
   OK    |-NOT OK--| illuminate, VOR/LOC prime indicator light      |
   ||    |         | remains illuminated).                          |
   ||    |         | Ref. Chart 146.                                |
   ||    |         ----------------------------------------------------
   ||    |
   ||    |         ----------------------------------------------------
   ||    |         | The roll bar does not move.                    |
   ||    |-NOT OK--| Replace AP/FD azimuth computer No.1 [3]        |
   ||              | (No.2 [6]).                                    |
   ||              ----------------------------------------------------
   ||
   ||
```

```
*****************************************************
* Check that no Autothrottle channel is engaged.    *
* By means of the ILS simulator, decrease GLIDE     *
* beam deviation until capture phase is initiated.  *
* -GLIDE mode selection push-button illuminates.    *
* -GLIDE prime indicator light extinguishes.        *
* -ALT HOLD mode selection push-button extinguishes.*
* -On Captain's (First Officer's) ADI, the pitch    *
* bar moves upwards.                                *
* -On each W & LD indicator, AT red warning light   *
* flashes. IF                                       *
*****************************************************
   ||    |
   ||    |          -----------------------------------------------
   ||    |          | GLIDE capture is not initiated.             |
   ||    |          | (GLIDE mode selection push-button does not  |
   ||    |          | illuminate, GLIDE prime indicator light     |
   OK    |          | remains illuminated).                       |
   ||    |-NOT OK--| Replace AP/FD pitch computer No.1 [2]       |
   ||    |          |(No.2 [5]).                                  |
   ||    |          | Repeat GLIDE capture.                       |
   ||    |          | If fault remains, replace ILS receiver No.1 |
   ||    |          | [73] (ILS receiver No.2 [74]).              |
   ||    |          -----------------------------------------------
   ||    |
   ||    |          -----------------------------------------------
   ||    |          | The pitch bar does not move.                |
   ||    |-NOT OK--| Replace AP/FD pitch computer No.1 [2]       |
   ||    |          | (No.2 [5]).                                 |
   ||    |          -----------------------------------------------
   ||    |
   ||    |          -----------------------------------------------
   ||    |          | AT warning lights do not flash              |
   ||    |          | Replace W & LD computer No.1 [34]           |
   ||    |-NOT OK--| (No.2 [35])                                 |
   ||               | Repeat GLIDE capture.                       |
   ||               | If fault remains, replace AP/FD pitch computer |
   ||               | No.1 [2] (No.2 [5]).                        |
   ||               -----------------------------------------------
   ||
   ||
```

```
*****************************************************
* On AFCS control unit, engage AT1 switch.          *
* - On each W & LD indicator, the AT warning        *
*   light extinguishes. IF                          *
*****************************************************
   ||    |
   ||    |      -------------------------------------------------
   OK    |-NOT OK--| No cancellation of AT warning lights.        |
   ||              | Ref. 22-41-00, Trouble Shooting               |
   ||           -------------------------------------------------
   ||
*****************************************************
* Disengage AT1 switch engage AT2 switch            *
* - AT warning lights do not flash. IF              *
*****************************************************
   ||    |
   ||    |      -------------------------------------------------
   OK    |-NOT OK--| No cancellation of AT warning lights.        |
   ||              | Ref. 22-41-00, Trouble Shooting.              |
   ||           -------------------------------------------------
   ||
*****************************************************
* By means of ILS simulator, cancel LOC deviation   *
* -On Captain's (First Officer's) ADI, the roll     *
*  bar is centered.                                 *
* -On each W & LD indicator, the LOC deviation bars *
*  extinguish.                                      *
*****************************************************
   |||
   ||    |
   ||    |      -------------------------------------------------
   OK    |-NOT OK--| FD1 (FD2) switch disengages.                 |
   ||    |         | Ref. Chart 147.                               |
   ||    |      -------------------------------------------------
   ||    |
   ||    |      -------------------------------------------------
   ||    |-NOT OK--| The roll bar is not centered                 |
   ||    |         | Ref. Chart 148.                               |
   ||    |      -------------------------------------------------
   ||    |
   ||    |      -------------------------------------------------
   ||    |         | The LOC deviation bars do not extinguish.     |
   ||    |-NOT OK--| Ref. 22-41-00, Trouble Shooting.              |
   ||           -------------------------------------------------
```

```
*****************************************************
* Disengage FD1 (FD2) switch.                       *
* Simulate an aircraft deviation to the right of    *
* LOC beam and above GLIDE beam (max. deviation     *
* to prevent capture phase).                        *
* Engage FD1 (FD2) switch and select ALT HOLD and   *
* HDG/TRK modes.                                    *
* -HDG/TRK and ALT HOLD mode selection push-buttons *
*  illuminate.                                      *
* Select LAND mode.                                 *
* -LAND, GLIDE, and VOR/LOC prime indicator lights  *
*  illuminate.                                      *
* -On each W &LD indicator, the aircraft symbol,    *
*  the LH side LOC deviation bar and the lower GLIDE*
*  deviation bar are illuminated.                   *
*****************************************************
    ||    |
    ||    |          --------------------------------------------------
    ||    |         | LAND, GLIDE, and VOR/LOC prime indicator lights|
    ||    |         | do not illuminate.                             |
    OK    |-NOT OK--| Replace AP/FD azimuth computer No.1 [3]        |
    ||    |         | (No.2 [6]).                                    |
    ||    |         | Repeat check.                                  |
    ||    |         | If fault remains, replace AFCS control unit [1]|
    ||    |          --------------------------------------------------
    ||    |
    ||    |          --------------------------------------------------
    ||    |         | VOR/LOC or LAND prime indicator light does not |
    ||    |-NOT OK--| illuminate.                                    |
    ||    |         | Replace AP/FD azimuth computer No.1 [3]        |
    ||    |         | (No.2 [6]).                                    |
    ||    |          --------------------------------------------------
    ||    |
    ||    |          --------------------------------------------------
    ||    |         | GLIDE prime indicator light does not illuminate|
    ||    |         | Replace AP/FD pitch computer No.1 [2]          |
    ||    |-NOT OK--| (No.2 [5]).                                    |
    ||    |         | Repeat check.                                  |
    ||    |         | If fault remains, replace AP/FD azimuth        |
    ||    |         | computer No.1 [3] (No.2 [6]).                  |
    ||    |          --------------------------------------------------
    ||    |
    ||    |          --------------------------------------------------
    ||    |         | Illumination of excessive beam deviation bars  |
    ||    |-NOT OK--| and of aircraft symbol not correct.            |
    ||              | Ref. 22-41-00, Trouble Shooting.               |
    ||               --------------------------------------------------
```

```
*****************************************************
* Select PITCH HOLD mode.                           *
* -PITCH HOLD mode selection push-button illuminates*
* -LAND, VOR/LOC and GLIDE prime indicator lights   *
*  extinguish.                                      *
* On each W & LD indicator the aircraft symbol      *
* as well as the LOC and the GLIDE beam deviation   *
* bars extinguish.                                  *
*****************************************************
   ||    |
   ||    |        ---------------------------------------------------
   ||    |        | LAND, VOR/LOC, and GLIDE prime indicator lights|
   OK    |-NOT OK--| remain illuminated.                            |
   ||    |        | Replace AP/FD pitch computer No.1 [2]          |
   ||    |        | (No.2 [5]).                                    |
   ||    |        ---------------------------------------------------
   ||    |
   ||    |        ---------------------------------------------------
   ||    |        | GLIDE prime indicator light remains illuminated|
   ||    |-NOT OK--| Replace AP/FD pitch computer No.1 [2]          |
   ||    |        | (No.2 [5]).                                    |
   ||    |        ---------------------------------------------------
   ||    |
   ||    |        ---------------------------------------------------
   ||    |        | LAND and/or VOR/LOC prime indicator light (5)  |
   ||    |        | remain (s) illuminated.                        |
   ||    |-NOT OK--| Replace AP/FD azimuth computer No.1 [3]        |
   ||             | (No.2 [6]).                                    |
   ||             ---------------------------------------------------
   ||
*****************************************************
* Select LAND mode.                                 *
* By means of ILS simulator, decrease GLIDE         *
* deviation until capture phase is initiated.       *
* -GLIDE mode selection push-button illuminates. IF *
*****************************************************
   ||    |
   ||    |        ---------------------------------------------------
   ||    |        | On GLIDE capture, FD1 (FD2) switch disengages. |
   OK    |-NOT OK--| Replace AP/FD pitch computer No.1 [2]          |
   ||             | (No.2 [5]).                                    |
   ||             ---------------------------------------------------
   ||
   ||
```

```
***********************************************
* By means of ILS simulator, cancel LOC deviation   *
* -LAND mode selection push-button illuminates      *
* -VOR/LOC and LAND prime indicator lights          *
*  extinguish. IF                                   *
***********************************************
   ||    |
   ||    |          ---------------------------------------------------
   ||    |          | LAND mode selection push-button does not       |
   OK    |-NOT OK--| illuminate. (LAND prime indicator light        |
   ||    |          | is illuminated)                                |
   ||    |          | Ref. Chart 149.                                |
   ||    |          ---------------------------------------------------
   ||    |
   ||    |          ---------------------------------------------------
   ||    |-NOT OK--| FD1 (FD2) switch disengages.                   |
   ||               | Ref. Chart 150.                                |
   ||               ---------------------------------------------------
   ||
***********************************************
* Engage AP1 (AP2) switch.                          *
* AP engages in LAND mode. IF                       *
***********************************************
   ||    |
   ||    |          ---------------------------------------------------
   OK    |-NOT OK--| AP1 (AP2) switch does not remain engaged       |
   ||               | Ref. Chart 151.                                |
   ||               ---------------------------------------------------
   ||
***********************************************
* On AFCS datum adjust unit, rotate TURN knob       *
* -LAND mode remains engaged                        *
* -Elevons do not deflect. IF                       *
***********************************************
   ||    |
   ||    |          ---------------------------------------------------
   OK    |-NOT OK--| TURN Knob operates correctly.                  |
   ||               | Replace AP/FD azimuth computer No.1 [3]        |
   ||               | (No.2 [6]).                                    |
   ||               ---------------------------------------------------
   ||
   ||
   ||
```

```
***************************************************
* On Captain's (First Officer's) side, switch off   *
* radio altimeter.                                  *
* -AP1 and FD1 (AP2 and FD2) switches disengage.    *
* -The AP aural and visual warnings are triggered.  *
* IF                                                *
***************************************************
   ||     |       ------------------------------------------------
   OK     |-NOT OK--| AP1 and FD1 (AP2 and FD2) remain engaged     |
   ||             | Ref. 22-41-00, Trouble Shooting.             |
   ||             ------------------------------------------------
---------------------------------------------------
| Operate Captain's (First Officer's) radio         |
| altimeter. Cancel AP warnings.                    |
| On ADC control panel, place ADC1 (ADC2) selector  |
| switch in TEST 1 position.                        |
| When data is stabilized, press ADC1 and ADC2      |
| caption lights.                                   |
| Re-engage systems, as necessary.                  |
| On AFCS control unit, by means of SPEED SELECT    |
| switch, display the speed read on airspeed        |
| indicator.                                        |
| On AUTOTHROTTLE section, select IAS ACQ mode.     |
| Engage AP1 (AP2) switch and select LAND mode.     |
| -LAND mode selection push-button illuminates.     |
| -On each W & LD indicator, LAND 2 caption light   |
|  remains illuminated.                             |
| -On Compass Coupler No.1 (No.2), DG indicator     |
|  light illuminates.                               |
---------------------------------------------------
   ||     |       ------------------------------------------------
   ||     |       | On selection of LAND mode, LAND 2 caption light|
   OK     |-NOT OK--| illuminates, then extinguishes.              |
   ||     |       | Replace AP/FD pitch computer No.1 [2]        |
   ||     |       | (No.2 [5]).                                  |
   ||     |       ------------------------------------------------
   ||     |       ------------------------------------------------
   ||     |-NOT OK--| On selection of LAND mode, LAND 2 caption light|
   ||     |       | does not illuminate.                         |
   ||     |       | Ref. 22-41-00, Trouble Shooting.             |
   ||     |       ------------------------------------------------
   ||     |       ------------------------------------------------
   ||     |       | On Compass Coupler unit No.1 (No.2),         |
   ||     |-NOT OK--| DG indicator light does not illuminate.      |
   ||             | Ref. Chart 152.                              |
   ||             ------------------------------------------------
   ||
```

```
*****************************************************
* On Captain's (First Officer's) side,              *
* simulate a radio altitude of 1000 feet.           *
* On ADC control panel, place ADC1 (ADC2) switch    *
* in OFF position.                                  *
* AP1 (AP2) switch remains engaged. IF              *
*****************************************************
   ||    |
   ||    |    ---------------------------------------------------
   OK    |-NOT OK--| AP1 (AP2) switch disengages.                 |
   ||              | Replace AP/FD pitch computer No.1 [2]        |
   ||              | (No.2 [5]).                                  |
   ||         ---------------------------------------------------
   ||
*****************************************************
* Place ADC1 (ADC2) selector switch in TEST 1       *
* position.                                         *
* Simulate a radio altitude of 80 feet              *
* Disengage both ELECTRIC TRIM switches.            *
* -AP1 switch remains engaged. IF                   *
*****************************************************
   ||    |
   ||    |    ---------------------------------------------------
   OK    |-NOT OK--| AP1 (AP2) switch disengages.                 |
   ||              | Replace AP/FD pitch computer No.1 [2]        |
   ||              | (No.2 [5]).                                  |
   ||         ---------------------------------------------------
   ||
*****************************************************
* Re-engage both ELECTRIC TRIM switches.            *
* Pull control column for full contact on AP force  *
* limiter.                                          *
* -AP1 (AP2) switch remains engaged. IF             *
*****************************************************
   ||    |
   ||    |    ---------------------------------------------------
   ||    |         | AP1 (AP2) switch disengages.                 |
   OK    |-NOT OK--| Replace AP/FD pitch computer No.1 [2]        |
   ||              | (No.2 [5]).                                  |
   ||         ---------------------------------------------------
-----------------------------------------------------
| Release control column.                           |
| Decrease radio altitude to 0 ft.                  |
| - On W & LD indicator, F caption light illuminates|
-----------------------------------------------------
   ||    |
   ||    |
```

OK | -NOT OK-- F caption light does not illuminate.
Replace AP/FD pitch computer No.1 [2] (No.2 [5]). Repeat check.
If fault remains, ref. 22-41-00, Trouble Shooting.

Engage FD1 (FD2) switch.
Increase radio altitude to 80 feet.
Simulate a LOC beam deviation to cause LOC beam deviation bars to illuminate on both W & LD indicators
- On glareshield, both AUTOLAND warning lights flash

OK | -NOT OK-- Both AUTOLAND warning lights remain extinguished. Ref. 22-41-00, Trouble Shooting.

Disengage AT system and push the four throttle control levers to max. thrust position.
-GO AROUND caption light illuminates.
-LAND mode selection push-button extinguishes.
-AUTOLAND warning lights extinguish
-On Captain's (First Officer's) ADI, the pitch bar moves upwards.
-The control column moves rearwards.

OK | -NOT OK-- GO AROUND mode is not operative.
Replace AP/FD azimuth computer No.1 [3] (No.2 [6]).

-NOT OK-- AUTOLAND warning lights flash
Ref. 22-41-00, Trouble Shooting.

-NOT OK-- The pitch bar and the control column remain steady.
Replace pitch computer No.1 [2] (No.2 [5]).
Repeat check. If fault remains, replace AP/FD azimuth computer No.1 [3] (No.2 [6]).

```
*****************************************************
* Pull the 4 throttle control levers rearwards, and *
* engage AT system in IAS ACQ mode.                 *
* Select PITCH HOLD mode.                           *
* - GO AROUND caption light extinguishes.           *
* - PITCH HOLD and HDG HOLD mode selection push     *
*   buttons illuminate. IF                          *
*****************************************************
   ||    |         ------------------------------------------------
   ||    |        | GO AROUND caption light remains illuminated.   |
   ||    |        | Replace AP/FD pitch computer No.1 [2]          |
   OK    |-NOT OK--| (No.2 [5]).                                   |
   ||             | Repeat check. If fault remains, replace        |
   ||             | AP/FD azimuth computer No.1 [3] (No.2 [6]).    |
   ||              ------------------------------------------------
-----------------------------------------------------
| Cancel LOC deviation.                             |
| Select LAND mode                                  |
| Simulate a radio altitude of 20 feet.             |
| On AFCS control unit, simultaneously rotate VOR-  |
| LOC1 and VOR-LOC2 push-pull knobs                 |
| -The control column handwheel rotates. IF         |
-----------------------------------------------------
   ||    |         ------------------------------------------------
   ||    |        | The control column handwheel does not rotate.  |
   ||    |        | Replace AP/FD azimuth computer No.1 [3]        |
   OK    |-NOT OK--| (No.2 [6]).                                   |
   ||             | Repeat check. If fault remains, replace        |
   ||             | Inertial Signal Comparator Unit [31].          |
   ||              ------------------------------------------------
   ||
-----------------------------------------------------
| Display the aircraft heading on VOR-LOC counters  |
| Decrease altitude to 0 ft.                        |
| - At 15ft altitude approximately, the throttle    |
|   control levers move towards flight idle stop. IF|
-----------------------------------------------------
   ||    |         ------------------------------------------------
   ||    |        | The throttle control levers do not move.       |
   ||    |        | Replace Autothrottle computer No.1 [4]         |
   OK    |-NOT OK--| (No.2 [7]).                                   |
   ||             | Repeat check. If fault remains, replace        |
   ||             | AP/FD pitch computer No.1 [2] (No.2 [5]).      |
   ||              ------------------------------------------------
   ||
   ||
```

```
***************************************************
* Place Captain's and First Officer's FD1/FD2     *
* switches in FD1 (FD2) position.                 *
* Check that circuit breakers G292 and G293       *
* respectively on panels 1-213 and 3-213, map ref. *
* M17 and B8 are set.                             *
* Disengage AP1 (AP2) switch. FD1 (FD2) remains   *
* engaged in LAND mode                            *
* -On each ADI, the yaw pointer appears and is    *
*  centred. IF                                    *
***************************************************
   ||    |
   ||    |         ----------------------------------------------
   ||    |         | On each ADI the yaw pointer does not appear. |
   OK    |-NOT OK--| Replace AP/FD azimuth computer No.1 [3]      |
   ||    |         | (No.2 [6]).                                  |
   ||    |         | If fault remains, replace W & LD computer    |
   ||    |         | No.1 [34] (No.2 [35]).                       |
   ||    |         ----------------------------------------------
   ||    |         ----------------------------------------------
   ||    |-NOT OK--| On Captain's ADI, the yaw index does not appear|
   ||    |         | Ref. Chart 153.                              |
   ||    |         ----------------------------------------------
   ||    |         ----------------------------------------------
   ||    |         | On First Officer's ADI, the yaw pointer does |
   ||    |-NOT OK--| not appear.                                  |
   ||    |         | Ref. Chart 154.                              |
   ||    |         ----------------------------------------------
   ||    |         ----------------------------------------------
   ||    |         | On each ADI, the yaw pointer is not centred. |
   ||    |-NOT OK--| Replace AP/FD azimuth computer No.1 [3]      |
   ||    |         | (No.2 [6]).                                  |
   ||    |         ----------------------------------------------
   ||    |         ----------------------------------------------
   ||    |         | On Captain's ADI, the yaw pointer is not     |
   ||    |-NOT OK--| centred.                                     |
   ||    |         | Ref. Chart 155.                              |
   ||    |         ----------------------------------------------
   ||    |         ----------------------------------------------
   ||    |         | On First Officer's ADI, the yaw pointer      |
   ||    |-NOT OK--| is not centred.                              |
   ||    |         | Ref. Chart 156.                              |
   ||    |         ----------------------------------------------
   ||    |         ----------------------------------------------
   ||    |         | FD1 (FD2) switch disengages.                 |
   ||    |-NOT OK--| Ref. Chart 157.                              |
   ||              ----------------------------------------------
```

```
***************************************************
* On AFCS control unit, rotate VOR-LOC 1          *
* (VOR-LOC 2).                                    *
* On each ADI, the yaw pointer moves accordingly. IF*
***************************************************
   ||    |    -----------------------------------------------
   ||    |    | On each ADI, the yaw pointer remains steady. |
   OK    |-NOT OK--| Replace AP/FD azimuth computer No.1 [3]  |
   ||    |    | (No.2 [6]).                                  |
   ||    |    -----------------------------------------------
   ||    |    -----------------------------------------------
   ||    |    | On Captain's ADI, the yaw pointer remains    |
   ||    |-NOT OK--| steady.                                 |
   ||    |    | Ref. Chart 158.                              |
   ||    |    -----------------------------------------------
   ||    |    -----------------------------------------------
   ||    |    | On First Officer's ADI, the yaw pointer      |
   ||    |-NOT OK--| remains steady.                         |
   ||    |    | Ref. Chart 159.                              |
   ||    |    -----------------------------------------------
   ||    |    -----------------------------------------------
   ||    |-NOT OK--| FD1 (FD2) switch disengages.            |
   ||         | Ref. Chart 157.                              |
   ||         -----------------------------------------------
   ||
---------------------------------------------------
| Set both yaw pointers to centre position.       |
| Disengage FD1 (FD2) switch and disconnect ILS   |
| ground test unit.                               |
| Engage AP1 switch.                              |
| The switch remains engaged.                     |
| Engage AP2 switch.                              |
| The switch remains engaged.                     |
| AP1 switch disengages.                          |
---------------------------------------------------
   ||    |
   ||    |    -----------------------------------------------
   OK    |-NOT OK--| AP1 switch remains engaged.             |
   ||         | Replace AP/FD pitch computer No.1 [2]        |
   ||         | If fault remains, replace AP/FD pitch computer |
   ||         | No.2 [5].                                    |
   ||         -----------------------------------------------
```

```
*****************************************************
* Engage AP1 switch.                                *
* The switch remains engaged.                       *
* AP2 switch disengages. IF                         *
*****************************************************
   ||   |
   ||   |  --------------------------------------------------
   OK   |-NOT OK--| AP2 switch remains engaged.               |
   ||             | Replace AP/FD pitch computer No/1 [2]     |
   ||             | If fault remains, replace AP/FD pitch computer |
   ||             | No.2 [5].                                 |
   ||              --------------------------------------------------
   ||
-----------------------------------------------------
| Engage FD1 and FD2 switches.                      |
| Seelect LAND mode.                                |
| Engage AP2 switch.                                |
| -AP1 and AP2 switches remain engaged. IF          |
-----------------------------------------------------
        |
        |  --------------------------------------------------
        |-NOT OK--| Either AP1 or AP2 disengages.             |
                  | Replace AP/FD pitch computer No.1 [2]     |
                  | If fault remains, replace AP/FD pitch computer |
                  | No.2 [5].                                 |
                   --------------------------------------------------
```

```
*************************************
* ON TEST OF LIGHTS,                *
* ALL LIGHTS DO NOT ILLUMINATE      *
* ON CAPTAIN'S SIDE                 *
*************************************


*************************************
* Replace faulty bulb(s).           *
* Repeat check of lights by means of *
* LH side controle LIGHTS-LO-HI-TEST *
* hold-to-test switch.              *
* All lights illuminate.            *
*************************************
        |
        |         ------------------------------------------------
        |         | Replace computer(s) associated with faulty   |
        |         | light(s) :                                    |
        |         | MACH HOLD-MAX OP-IAS HOLD-ALT HOLD-GLIDE-     |
       NO---------| MAX OP SOFT-VERT SPEED-ALT ACQ lights and     |
                  | associated prime lights, AP1 caption light :  |
                  | AP/FD pitch computer No.1 [2].                |
                  | Other AP modes : replace AP/FD azimuth computer|
                  | No.1 [3]                                      |
                  | Autothrottle modes : replace autothrottle     |
                  | computer No.1 [4].                            |
                  ------------------------------------------------
```

Chart 101

```
*************************************
* ON TEST OF LIGHTS,                *
* ALL LIGHTS DO NOT ILLUMINATE.     *
* ON FIRST OFFICER'S SIDE           *
*************************************


*************************************
* Replace faulty bulb(s)            *
* Repeat check by means of          *
* RH side console LIGHTS-LO-HI-TEST *
* hold-to-test switch.              *
* All lights illuminate :           *
*************************************
        |
        |        ------------------------------------------------
        |        | Replace computer (s) associated with faulty  |
        |        | light(s) :                                   |
        |        | MACH HOLD -MAX OP - IAS HOLD -ALT HOLD - GLIDE|
        |        | MAX OP SOFT -VERT SPEED -ALT ACQ lights and  |
       NO--------| associated prime lights, AP2 caption light : |
                 | replace AP/FD pitch computer No.2 [5].       |
                 | Other AP modes : replace AP/FD azimuth computer|
                 | No.2 [6].                                    |
                 | Autothrottle modes : replace autothrottle    |
                 | computer No.2 [7].                           |
                 ------------------------------------------------
```

Chart 102

```
*************************************
* FD1 (FD2) SWITCH DOES NOT ENGAGE. *
*************************************


***********************************************
* Engage side 1 (side 2) of ITEM system in IFM *
* function ; cancel previous failures as       *
* necessary (Ref. par. 2, Prepare).            *
* Engage FD1 (FD2) switch. Switch disengages.  *
* Read data stored by ITEM system. IF          *
***********************************************
        |              |           |
        |              |           |
  No indication       FD.A        FD.P
        |              |           |
        |              |           |
        |              |           |
        |              |      ----------------------------------
        |              |      | Replace pitch computer No.1 [2] |
        |              |      | (No.2 [5]).                     |
        |              |      ----------------------------------
        |              |
        |   ------------------------------------
        |   | Replace azimuth computer No.1 [3] |
        |   | (No.2 [6]).                       |
        |   ------------------------------------
        |
----------------------------------
| Replace AFCS control unit [1] |
----------------------------------
```

Chart 103

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AP1 (AP2) SWITCH DOES NOT ENGAGE

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART NO.
MULTIMETER	

Engage AP1 (AP2) switch. On AP disengagement, there is a jerk of flight controls. IF

- YES:
  - Disengagement with jerk on control column
    Ref. Sheet 7
  - Disengagement with jerk on control column handwheel.
    Ref. Sheet 8
  - Disengagement with jerk on pedals.
    Ref. Sheet 9
- NO:
  Engage side 1 (side 2) of ITEM system in IFM function. Cancel previous failures as necessary, (Ref. par. 2, Prepare)
  Engage AP1 (AP2) switch. Switch disengages.
  Stored data displayed are :
  - No indication — Ref. Sheet 2
  - AP.A — Ref. Sheet 3
  - AP.P — Ref. Sheet 5

Chart 104 (Sheet 1 of 9)

Disconnect AFCS control unit [1] and AP/FD pitch computer No.1 [2] (No.2 [5]). On aircraft side, check continuity between pins C1-AA71 (C1-BA71) of AFCS control unit and pins 1C12 -AA20 (2C12 -AA20) of computer :

OK → Replace AFCS control unit [1].

NOT OK → Check Captain's AP DISC switch [8].

- OK → Replace First Officer's AP DISC switch [9].
- NOT OK → Replace Captain's AP DISC switch [8].

Chart 104 (Sheet 2 of 9)

Engage side 1 (side 2) ITEM system in TEST UNIT function. Select AP.A indication and start azimuth computer test (Ref. par. 2, Prepare). On completion of test, stored data displayed are :

AP.A - PASS

AP.A - COMP or AP.A - LAND

Replace AP/FD azimuth computer No.1 [3], (No.2 [6]).

On sockets of azimuth computer No.1 [3] (No.2 [6]) front face, connect voltmeter between pins :
ZA26 and ZA54 for comparator C6
ZA32 and ZA54 for comparator C9
On disengagement of AP1 (AP2), voltage reading is-12V on :

C6

C9

Rotate control column handwheel. AUTOSTAB No.1 (No.2) control unit YAW lever disengages.

Ref. Sheet 4

YES

NO

Replace AP/FD azimuth computer No.1 [3] (No.2 [6]). Engage AP1 (AP2) switch. If switch does not remain engaged, replace roll relay jack [14].

Replace roll relay jack sensor [11].

Chart 104 (Sheet 3 of 9)

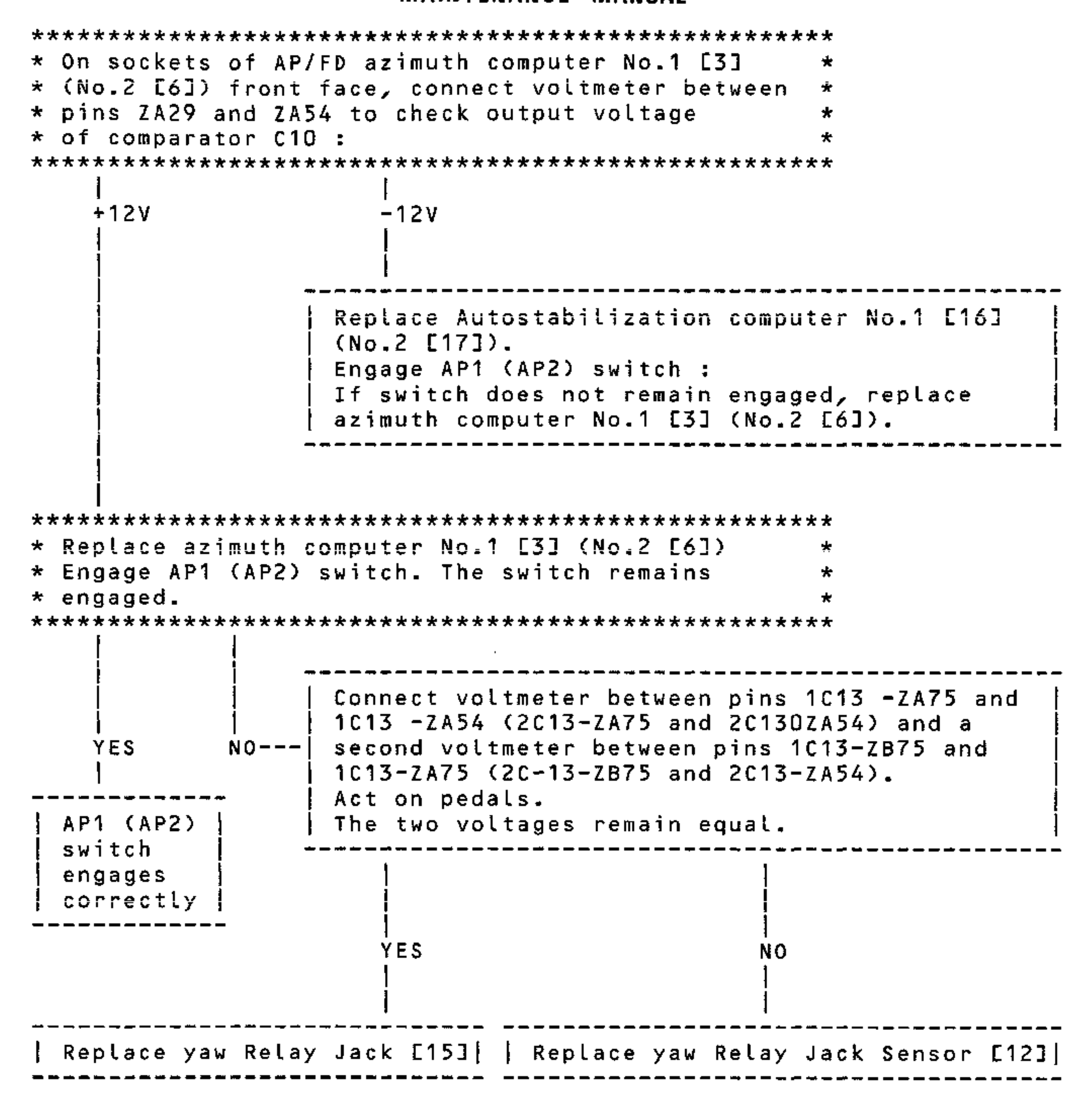


Chart 104 (Sheet 4 of 9)

```
**************************************************
* Engage side 1 (side 2) of ITEM system in TEST UNIT*
* function. Select AP.P indication and start AP/FD  *
* pitch computer test (Ref. par. 2, Prepare).       *
* On completion of test, stored data displayed are :*
**************************************************
    |                |
    AP.P             AP.P - COMP or
    PASS             AP.P - LAND
    |                |
    |     ------------------------------------------
    |     | Replace AP/FD pitch computer No.1 [2]  |
    |     | (No.2 [5]).                            |
    |     ------------------------------------------
--------------------------------------------------
| AP1 (AP2) switch engages, then, disengages.    |
--------------------------------------------------
    |       |     ------------------------------------------
    YES     NO---| Ref. Sheet 6                           |
    |             ------------------------------------------
--------------------------------------------------
| Replace AP/FD pitch computer No.1 [2]          |
| Engage AP1 (AP2) switch.                       |
| The switch remains engaged.                    |
--------------------------------------------------
    |       |     ------------------------------------------------
    YES     NO---| Connect voltmeter between pins 1C12-ZA47     |
    |            | and 1C13-ZA47 (2C12-ZA47 and 2C13-ZA54),     |
----------------  | and a second voltmeter between pins 1C12-ZB56 |
| AP1 (AP2)    | | and 1C13-ZA54 (2C12-ZB56 and 2C13-ZA54).     |
| switch engages| | Push control column in nose-down direction   |
| correctly.   | | Both voltages are equal.                     |
----------------  ------------------------------------------------
                        |                    |
                        YES                  NO
                        |                    |
------------------------------  -------------------------------
| Replace pitch Relay Jack   |  | Replace pitch Relay Jack Sensor|
| [13].                      |  | [10].                          |
------------------------------  -------------------------------
```

Chart 104 (Sheet 5 of 9)

```
**************************************************
* Replace AP/FD pitch computer No.1 [2] (No.2 [5]). *
* Engage AP1 (AP2) switch.                         *
* The switch remains engaged.                      *
**************************************************
    |        |
    |        |    ----------------------------------------------
   YES       NO---| On engaging, the locking of relay jacks can  |
    |             | be heard                                     |
-------------------------------------------------------------------
| AP1 (AP2)       |     |                   |
| switch engages  |     NO                 YES
| correctly.      |     |                   |
-----------------       |     -------------------------------------
                        |     | Hold AP1 (AP2) switch engaged and  |
                        |     | operate flight controls.           |
                        |     | Determine which axis is not locked |
                        |     | and replace associated relay jack  |
                        |     | (RJ : Pitch [13], Roll [14], yaw [15]|
                        |     | If no axis is locked, replace pitch |
                        |     | relay jack sensor [10]             |
                        |     -------------------------------------
                        |
-----------------------------------------------------
| Disconnect AP/FD pitch computer No.1 [2] (No.2    |
| [5]).                                             |
| On aircraft side, check continuity between pins   |
| 1C12-AA50 and 1C12-AA52 (2C12-AA50 and 2C12-AA52) |
| of computer.                                      |
-----------------------------------------------------
    |        |         ---------------------------------------
    |        |         | Check continuity of switches of AP force |
    |        |         | limiters C7 [18], C9 [19], C11 [20]      |
   OK      NOT OK----| between pins A and C of sockets C7-A,     |
    |                  | C9-A, C11-A (C7-B, C9-B, C11-B). Replace |
    |                  | faulty switch.                           |
    |                  ---------------------------------------
    |
--------------------------------------
| Replace AFCS control unit [1].     |
--------------------------------------
```

Chart 104 (Sheet 6 of 9)

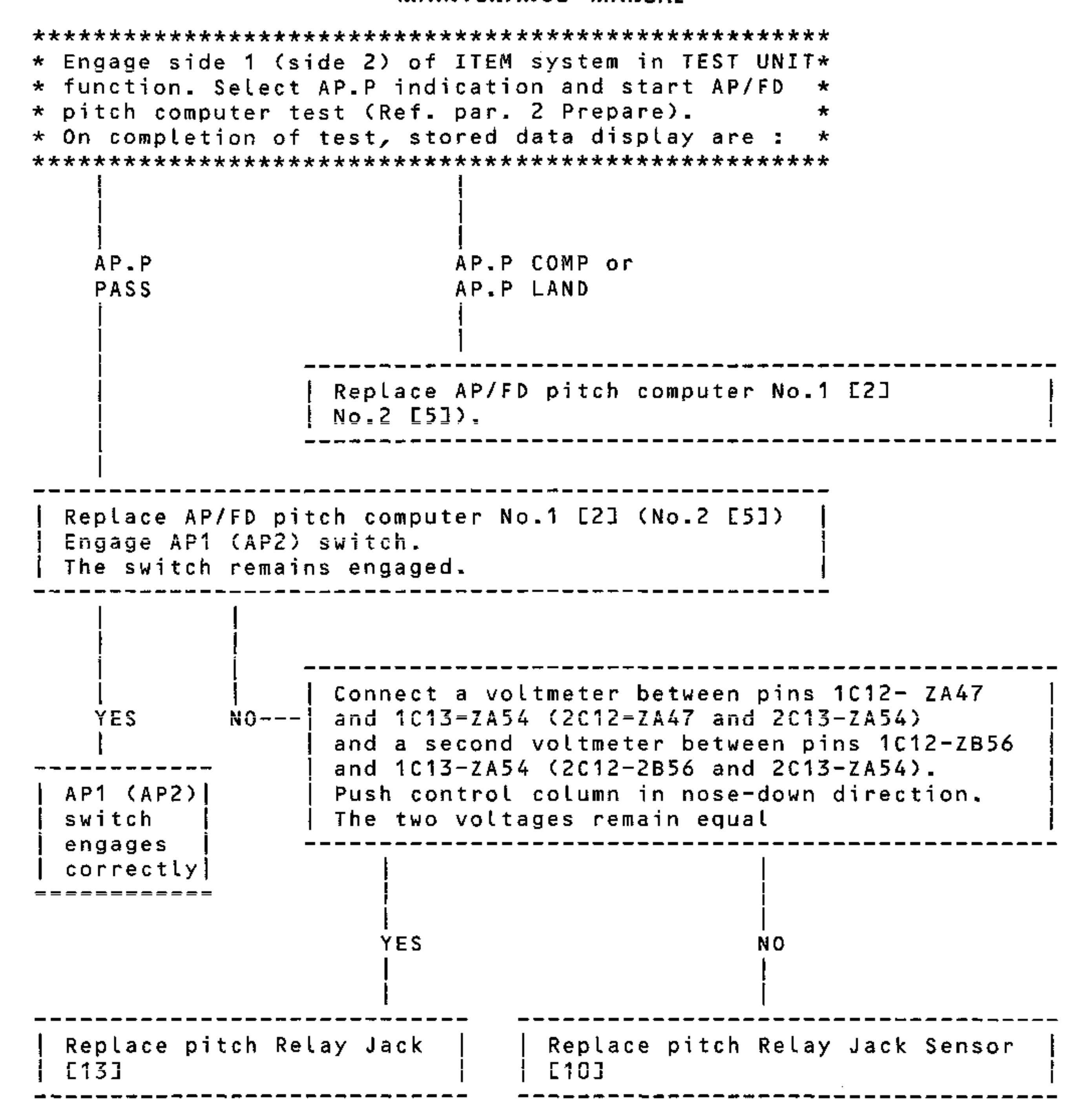


Chart 104 (Sheet 7 of 9)

```
**************************************************
* Engage side 1 (side 2) of ITEM system in TEST UNIT*
* function. Select AP.A and start AP/FD azimuth    *
* computer test (Ref. par. 2 Prepare) :            *
* On completion of test, stored data displayed are :*
**************************************************
     |                  |
     |                  |
    AP.A               AP.A - COMP or
    PASS               AP.A - LAND
     |                  |
     |                  |
     |           ---------------------------------------------------
     |           | Replace AP/FD azimuth computer No.1 [3]          |
     |           | (No.2 [6]                                        |
     |           ---------------------------------------------------
     |
------------------------------------------------
| Rotate control column handwheel (20 degree    |
| amplitude approximately).                      |
| AUTOSTAB No.1 (No.2) YAW lever disengages.    |
------------------------------------------------
     |        |  ---------------------------------------------------
    YES      NO---| Replace AP/FD azimuth computer No.1 [3]          |
     |           | (No.2 [6])                                       |
     |           | Engage AP1 (AP2) switch.                         |
     |           | The switch remains engaged.                      |
     |           | If switch does not remain engaged, replace       |
     |           | roll Relay Jack [14].                            |
     |           ---------------------------------------------------
     |
------------------------------------------------
| Replace roll relay Jack Sensor [11].           |
------------------------------------------------
```

Chart 104 (Sheet 8 of 9)

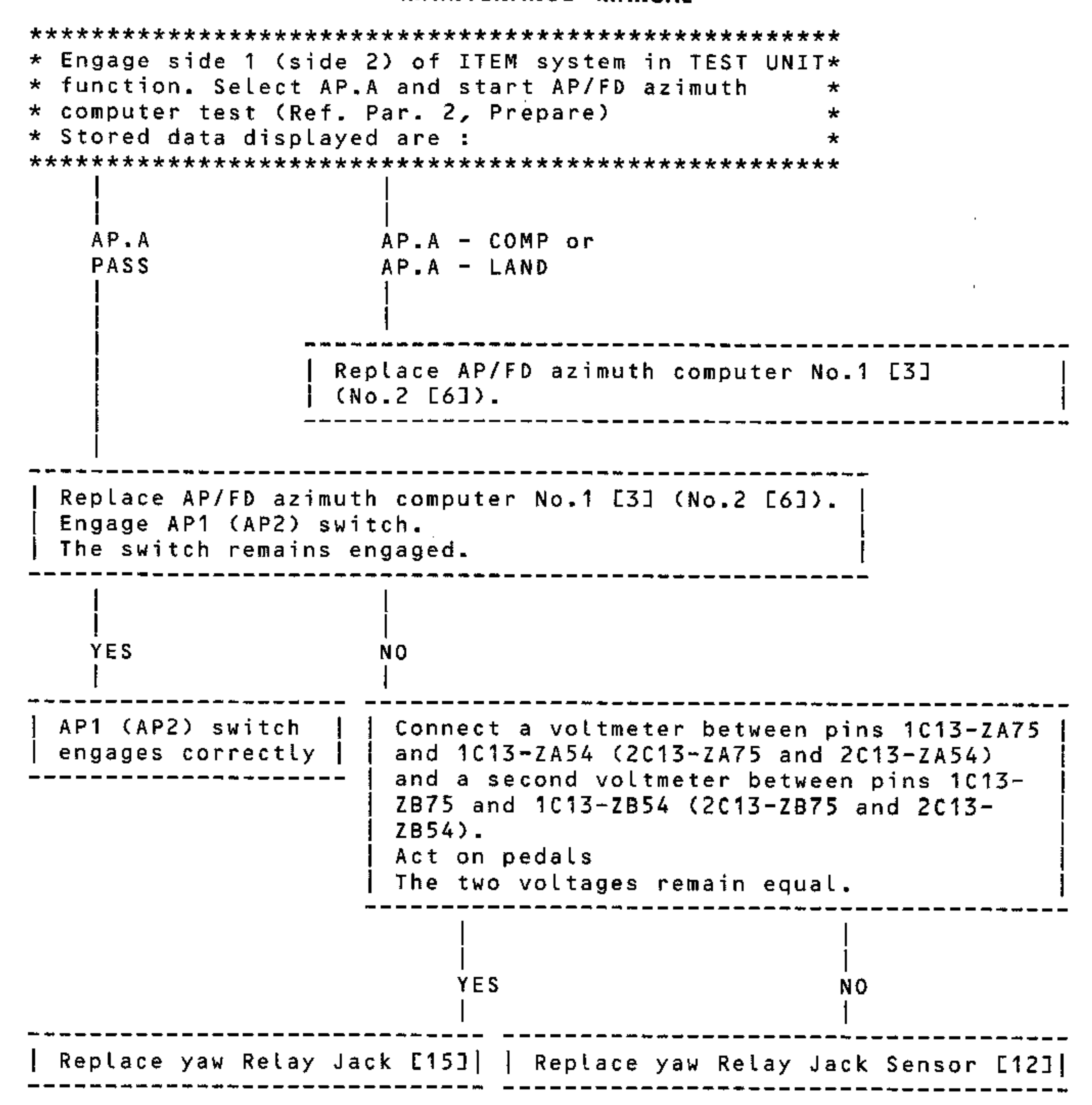


Chart 104 (Sheet 9 of 9)

AP1 AND FD1 (AP2 AND FD2) SWITCHES DO NOT ENGAGE.

GROUND EQUIPMENT REQUIRED	
DESIGNATION	PART NO.
MULTIMETER	

Engage side 1 (side 2) ITEM system in TEST UNIT function.
On ITEM control and indicator panel, red warning lights illuminate.

- NO → (continued on the next sheet)
- YES →
  - Check on AP/FD pitch and azimuth computers No.1, [2] and [3] (No.2 [5] and [6]) that 115V supply is provided.
    Both pointers remain steady.
    - NO →
      - Replace AP/FD pitch computer No.1 [2] (No.2 [5]).
        Both pointers pulsate.
        - NO →
          - Replace AP/FD azimuth computer No.1 [3] (No.2 [6]).
            If both pointers remain steady, check 28V supply from circuit breaker 1C17 [21] (2C17 [22]).
    - YES →
      - Replace circuit breaker 1C18 [23] (2C18 [24]).

Chart 105 (Sheet 1 of 3)

Select a VOR frequency on both VOR-ILS-DME control units.
On ADI No.1 [27] (No.2 [28]), G/S and LOC flags do not appear.

YES / NO

NO → Check 26V supply from circuit breaker 1C20 [25] (2C20 [26]).

YES →

Engage side 1 (side 2) of ITEM system in IFM function. Cancel previous failures, as necessary (Ref. par.2, Prepare).
Engage AP1 and FD1 (AP2 and FD2) switches.
Both switches disengage.
Stored data displayed are :

WLD / INS / SFC / AP.A or FD.A / AP.P or FD.P

AP.P or FD.P → Ref. Sheet 3

AP.A or FD.A → Replace AP/FD azimuth computer No.1 [3] (No.2 [6].

SFC → Replace SFC computer No.1 [29] (No.2 [30])

INS → Replace Inertial Signal Comparator Unit [31].

WLD →

Press W & LD indicator No.1 [32] (No.2 [33]) TEST push-button. On indicator, all lights illuminate.

NO / YES

NO → Check 28V supply from circuit breakers 1C192 [36], 1C193 [37] (2C192 [38], 2C193 [39]) and 115V supply from circuit breaker 1C191 [40] (2C191 [41]).

YES → Replace W & LD computer No.1 [34] (No.2 [35]).

Chart 105 (Sheet 2 of 3)

```
*****************************************************
* Engage side 1 (side 2) of ITEM system in TEST UNIT*
* function, select AP.P and start AP/FD pitch       *
* computer test (Ref. par.2, Prepare).              *
* On completion of test, stored data displayed are :*
*****************************************************
     |                                  |
     |                                  |
    AP.P                               AP.P - COMP or
    PASS                               AP.P - LAND
     |                                  |
     |                                  |
     |              ------------------------------------------------
     |              | Replace AP/FD pitch computer No.1 [2]        |
     |              | (No.2 [5]).                                  |
     |              ------------------------------------------------
-----------------------------------------------------
| On AFCS control unit [1], engage AT1 (AT2) switch.|
| The switch remains engaged.                       |
-----------------------------------------------------
     |         |
     |         |    ------------------------------------------------
    YES       NO---| Replace Inertial Navigation Unit NO.1 [43]    |
     |             | (No.2 [43]).                                  |
     |              ------------------------------------------------
-----------------------------------------------------
| Replace AP/FD pitch computer No.1 [2] (No.2 [5])  |
| Engage AP1 and FD1 (AP2 and FD2) switches         |
| If both switches do not remain engaged, replace   |
| Autostabilization computer No.1 [16] (No.2 [17]). |
-----------------------------------------------------
```

Chart 105 (Sheet 3 of 3)

AUTOPILOT NOSE UP-NOSE DOWN TOGGLE SWITCH NOT OPERATIVE IN ONE OF THE FOUR POSITIONS.

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART NO.
MULTIMETER	

Disconnect AFCS datum adjust unit [44]
On AFCS datum adjust unit side, check continuity between pins :

M and B of plug C2-A (C2-B) when toggle switch is in UP (slow or fast) positions, for failure in UP direction

M and A of socket C2-A (C2-B) when toggle switch is in DOWN (slow or fast) positions, for failure in DOWN direction.

N and B of socket C2-A (2-B) when toggle switch is in the slow (DOWN and UP) positions, for failure in a slow position.

N and A of socket C2-A (C2-B) when toggle switch is in the fast (DOWN and UP) positions, for failure a fast position.

CONTINUITY: Replace AP/FD pitch computer No.1 [2] (No.2 [5]).

DISCONTINUITY: Replace AFCS datum adjust unit [44].

Chart 106

AP1 (AP2) SWITCH DISENGAGES

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART NO.
MULTIMETER	

Connect a voltmeter between pins 1C12-ZA47 and 1C13-ZA54 (2C12-ZA47 and 2C13-ZA54), and another between pins 1C12-ZB56 and 1C13-ZA54 (2C12-ZB56 and 2C13-ZA54).
Push control column forward
The two voltages remain equal.

NO --- Replace pitch Relay Jack Sensor [10]

YES

Replace AP/FD pitch computer No.1 [2] (No.2 [5]).
Engage AP1 (AP2) switch.
Operate NOSE UP-NOSE DOWN toggle switch.
AP1 (AP2) remains engaged.

NO --- Replace pitch Relay Jack [13].

Chart 107

AP1 (AP2) SWITCH DISENGAGES.

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART NO.
MULTIMETERS	

On sockets of AP/FD azimuth computer No.1 [3] (No.2 [6]) front face, connect a voltmeter between pins :
-ZA26 and ZA54 for comparator C6.
-ZA32 and ZA54 for comparator C9.
On AP1 (AP2) disengagement, -12V supply is at comparator

C6 →

Rotate control column handwheel
AUTOSTAB No.1 (No.2) YAW lever disengages

- YES → Replace roll Relay Jack Sensor [11]
- NO → Replace AP/FD azimuth Computer No.1 [3] (No.2 [6]).
  Engage AP1 (AP2) switch
  Operate TURN knob.
  If AP1 (AP2) switch disengages replace roll Relay Jack [14].

C9 → (continued on Sheet 2)

Chart 108 (Sheet 1 of 2)

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Connect a voltmeter between pins 1C13-ZA75 and 1C13-ZA54 (2C13-ZA75 and 2C13-ZA54), and another between pins 1C13-ZB75 and 1C13-ZA54 (2C13-ZB75 and 2C13-ZA54). Press pedals. The two voltages remain equal.

YES — NO ---| Replace yaw Relay Jack Sensor [12] |

YES:

Replace AP/FD azimuth computer No.1 [3] (No.2 [6]) Engage AP1 (AP2) switch. Rotate TURN knob. If AP1 (AP2) disengages, replace yaw Relay Jack [15].

Chart 108 (Sheet 2 of 2)

```
**************************************************
* CAPTAIN'S AP DISC SWITCH [8] INOPERATIVE.      *
**************************************************



---------------------------------------------
| Press First Officer's AP DISC switch [9]   |
| AP1 (AP2) switch disengages.               |
| On both W & LD indicators [32] and [33],   |
| AP red warning lights illuminate.          |
| Cavalry charge aural warning sounds during |
| one second.                                |
---------------------------------------------
    |   |
    |   |      ---------------------------------------------
    |   |      | Trip circuit breaker 1C18 [23] (2C18 [24])  |
    |   |      | If AP1 (AP2) disengages, replace AP/FD pitch|
   YES  |-NO---| computer No.1 [2] (No.2 [5]).               |
    |          | If AP1 (AP2) does not disengage, replace    |
    |          | AFCS control unit [1]                       |
    |          ---------------------------------------------
    |
---------------------------------------------
| Replace Captain's AP DISC switch [8].      |
---------------------------------------------
```

Chart 109

```
**************************************
* FIRST OFFICER'S AP DISC SWITCH [9] *
* INOPERATIVE.                       *
**************************************
```

```
-----------------------------------------------------
| Press Captain's AP DISC switch [a]                |
| AP1 (AP2) switch disengages                       |
| On both W & LD indicators [32] and [33], AP red   |
| warning light illuminates.                        |
| Cavalry charge aural warning sounds during        |
| one second.                                       |
-----------------------------------------------------
    |   |
    |   |         --------------------------------------------------
    |   |         | Trip circuit breaker 1C18 [23] (2C18 [24]).     |
    |   |         | If AP1 (AP2) switch disengages, replace AP/FD   |
   YES  |-NO------| pitch computer No.1 [2] (No.2 [5]).             |
    |             | If AP1 (AP2) switch does not disengage, replace|
    |             | APCS control unit [1].                          |
    |             --------------------------------------------------
    |
    |
-----------------------------------------------------
| Replace First Officer's AP DISC switch [9].       |
-----------------------------------------------------
```

Chart 110

```
*************************************-----------------------------
* ON CAPTAIN'S ADI [27], FD FLAG    *| GROUND EQUIPMENT REQUIRED |
* IS VISIBLE.                       *|---------------------------|
*************************************| DESCRIPTION      PART NO. |
                                     |---------------------------|
                                     | MULTIMETER                |
                                     -----------------------------

-----------------------------------------------------
| Place Captain's and First Officer's FD1/FD2       |
| switches [45] and [46] in FD2 position.           |
| On each ADI, FD flag disappears.                  |
-----------------------------------------------------
      |    |
      |    |       ----------------------------------------------
     YES   |-NO------| On each ADI, FD flag is visible            |
      |    |         | Replace AP/FD azimuth computer No.2 [6].   |
      |    |       ----------------------------------------------
      |    |
      |    |       ----------------------------------------------
      |    |         | On Captain's ADI, FD flag is visible.      |
      |    |-NO------| Replace Captain's ADI [27].                |
      |            ----------------------------------------------
      |
-----------------------------------------------------
| Place Captain's and First Officer's FD1/FD2       |
| switches [45] and [46] in FD1 position.           |
| Disconnect Captain's FD1/FD2 switching unit 1C25  |
| [49] and check continuity on switching unit side  |
| between pins 1C25-AA3 and AA19.                   |
-----------------------------------------------------
      |    |
      |    |       ----------------------------------------------
     OK    |-NOT OK--| Replace Captain's FD1/FD2 switching unit 1C25 |
      |              | [49].                                      |
      |            ----------------------------------------------
      |
-----------------------------------------------------
| Replace Captain's FD1/FD2 switch 1C26 [45].       |
-----------------------------------------------------
```

Chart 111

```
*************************************----------------------------------
* ON FIRST OFFICER'S ADI [28],       *| GROUND EQUIPMENT REQUIRED     |
* FD FLAG IS VISIBLE.                *|-------------------------------|
**************************************| DESCRIPTION          PART NO. |
                                      |-------------------------------|
                                      | MULTIMETER                    |
                                      ---------------------------------

------------------------------------------------------
| Place Captain's and First Officer's FD1/FD2        |
| switches [45] and [46] in FD2 position.            |
| FD flag disappears from both ADIs'.                |
------------------------------------------------------
    |   |
    |   |     ----------------------------------------------------
   YES  |-NO------| FD flag is visible on each ADI.                  |
    |   |         | Replace AP/FD azimuth computer No.2 [6].         |
    |   |         ----------------------------------------------------
    |   |
    |   |         ----------------------------------------------------
    |   |-NO------| FD flag is visible on First Officer's ADI.       |
    |             | Replace First Officer's ADI [28].                |
    |             ----------------------------------------------------
    |
------------------------------------------------------
| Place Captain's and First Officer's FD1/FD2        |
| switches [45] and [46] in FD1 position.            |
| Disconnect First Officer's FD1/FD2 switching unit  |
| 2C25 [50] and check continuity on switching unit   |
| side between pin 2C25-AA9 and AA20.                |
------------------------------------------------------
    |   |
    |   |         ----------------------------------------------------
   OK   |-NO------| Replace First Officer's FD1/FD2 switching        |
    |             | unit 2C25 [50].                                  |
    |             ----------------------------------------------------
    |
------------------------------------------------------
| Replace First Officer's FD1/FD2 switch 2C26 [46].  |
------------------------------------------------------
```

Chart 112

```
*************************************
* ON CAPTAIN'S ADI [27],            *
* FD1 INDICATION DOES NOT APPEAR.   *
*************************************


----------------------------------------------------
| Trip circuit breaker 1C27 [47].                  |
| On Captain's ADI, FD1 indication appears.        |
----------------------------------------------------
    |   |
    |   |      ---------------------------------------------------
   YES  |-NO------| Replace Captain's ADI [27].                   |
    |              ---------------------------------------------------
    |
    |
----------------------------------------------------
| Replace Captain's FD1/FD2 switch [45].           |
----------------------------------------------------
```

Chart 113

```
*************************************
* ON FIRST OFFICER'S ADI [28],      *
* FD1 INDICATION DOES NOT APPEAR    *
*************************************


----------------------------------------------------
| Trip circuit breaker 2C27 [48]                   |
| FD1 indication appears on First Officer's ADI.   |
----------------------------------------------------
    |   |
    |   |             --------------------------------------------------
    |   |-NO-------| Replace First Officer's ADI [28].                 |
    |                 --------------------------------------------------
   YES
    |
----------------------------------------------------
| Replace First Officer's FD1/FD2 switch [46].     |
----------------------------------------------------
```

Chart 114

```
**************************************-------------------------------
* ON CAPTAIN'S ADI [27],              *| GROUND EQUIPMENT REQUIRED  |
* FD FLAG IS VISIBLE                  *|----------------------------|
**************************************| DESCRIPTION      PART NO.   |
                                       |----------------------------|
                                       | MULTIMETER                 |
                                       ------------------------------

----------------------------------------------------
| Disconnect Captain's FD1/FD2 switching unit 1C25 |
| [49], and check continuity on switching unit side |
| between pins 1C25-AA9 and AA20.                  |
----------------------------------------------------
      |    |
      |    |    ----------------------------------------------------
     OK    |-NO------| Replace Captain's FD1/FD2 switching unit 1C25 |
      |             | [49].                                         |
      |             ----------------------------------------------------
      |
----------------------------------------------------
| Replace Captain's FD1/FD2 switch 1C26 [45].      |
----------------------------------------------------
```

Chart 115

```
*************************************-------------------------------
* ON FIRST OFFICER'S ADI [28],      *| GROUND EQUIPMENT REQUIRED   |
* FD FLAG IS VISIBLE.               *|-----------------------------|
*************************************| DESCRIPTION  PART NO.       |
                                     |-----------------------------|
                                     | MULTIMETER                  |
                                     -------------------------------

-----------------------------------------------------
| Disconnect First Officer's FD1/FD2 switch 2C25    |
| [50] and check continuity on switching unit side  |
| between pins 2C25-AA3 and AA19.                   |
-----------------------------------------------------
    |   |
    |   |   --------------------------------------------------
    OK  |-NOT OK--| Replace First Officer's FD1/FD2 switching unit |
    |             | 2C25 [50].                                     |
    |             --------------------------------------------------
    |
-----------------------------------------------------
| Replace First Officer's FD1/FD2 switch 2C26 [46]. |
-----------------------------------------------------
```

Chart 116

```
**************************************-------------------------------
* ON CAPTAIN'S ADI [27],              *| GROUND EQUIPMENT REQUIRED   |
* FD2 INDICATION DOES NOT APPEAR      *|-----------------------------|
**************************************| DESCRIPTION        PART NO. |
                                      |-----------------------------|
                                      | MULTIMETER                  |
                                      -------------------------------

-----------------------------------------------------
| Engage FD2 switch.                                |
| On Captain's ADI, the pitch bar is centred.       |
-----------------------------------------------------
     |    |
     |    |      -----------------------------------------------------
     NO   |-YES-----| Replace Captain's ADI [27].                        |
     |              -----------------------------------------------------
     |
-----------------------------------------------------
| Check circuit breaker 1C27 [47].                  |
-----------------------------------------------------
     |    |      -----------------------------------------------------
     OK   |-NOT OK--| Replace circuit breaker 1C27 [47].                 |
     |              -----------------------------------------------------
     |
-----------------------------------------------------
| Replace Captain's FD1/FD2 switch [45].            |
-----------------------------------------------------
```

Chart 117

```
************************************-------------------------------
* ON FIRST OFFICER'S ADI [28]       *| GROUND EQUIPMENT REQUIRED  |
* FD2 INDICATION DOES NOT APPEAR    *|----------------------------|
*************************************| DESCRIPTION       PART NO. |
                                     |----------------------------|
                                     | MULTIMETER                 |
                                     ------------------------------

------------------------------------------------------
| Engage FD2 switch                                  |
| On First Officer's ADI, the pitch bar is centred.  |
------------------------------------------------------
    |   |
    |   |    ---------------------------------------------------
    NO  |-YES-----| Replace First Officer's ADI [28].          |
    |            ---------------------------------------------------
    |
------------------------------------------------------
| Check circuit breaker 2C27 [48].                   |
------------------------------------------------------
    |   |
    |   |    ---------------------------------------------------
    OK  |-NOT OK--| Replace circuit breaker 2C27 [48].         |
    |            ---------------------------------------------------
    |
------------------------------------------------------
| Replace First Officer's FD1/FD2 switch [46].       |
------------------------------------------------------
```

Chart 118

```
************************************-------------------------------
* PITCH HOLD MODE SELECTION PUSH-    *| GROUND EQUIPMENT REQUIRED   |
* BUTTON IS ILLUMINATED, AND ON      *|-----------------------------|
* CAPTAIN'S ADI THE PITCH BAR IS     *| DESCRIPTION        PART NO. |
* REMOVED.                           *|-----------------------------|
**************************************| MULTIMETER                  |
                                       -------------------------------

-----------------------------------------------------
| Engage FD2 (FD1) switch.                          |
| Place Captain's FD1/FD2 switch [45] in FD2 (FD1)  |
| position.                                         |
| On Captain's ADI, the pitchh bar is centred.      |
-----------------------------------------------------
      |   |
      |   |     ---------------------------------------------
     YES  |-NO------| Replace Captain's ADI [27].            |
      |               ---------------------------------------------
      |
-----------------------------------------------------
| Place Captain's FD1/FD2 switch in FD1 (FD2)       |
| position.                                         |
| Disconnect Captain's FD1/FD2 awitching unit [49]. |
| On switching unit side, check continuity between  |
| pins 1C25-AA32 and AA15 (AA32 and AA23) and pins  |
| 1C25-AA83 and AA16 (AA33 and AA22)                |
-----------------------------------------------------
      |   |
      |   |     ---------------------------------------------
      OK  |-NOT OK--| Replace Captain's FD1/FD2 switching unit [49] |
      |               ---------------------------------------------
      |
-----------------------------------------------------
| Replace AP/FD pitch computer No.1 [2] (No.2 [5]). |
| Connect Captain's FD1/FD2 switching unit [49].    |
| On Captain's ADI, if the pitch bar is still       |
| removed, replace W & LD computer No.1 [34]        |
| (No.2 [35]).                                      |
-----------------------------------------------------
```

Chart 119

PITCH HOLD MODE SELECTION PUSH BUTTON IS ILLUMINATED AND, ON FIRST OFFICER'S ADI, THE PITCH BAR IS OUT OF-VIEW

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART NO.
MULTIMETER	

Engage FD2 (FD1) switch.
Place First Officer's FD1/FD2 switch [46] in FD2 (FD1) position.
On First Officer's ADI, the pitch bar is centred.

- YES → continue below
- NO → Replace First Officer's ADI [28].

Place First Officer's FD1/FD2 switch in FD1 (FD2) position.
Disconnect First Officer's FD1/FD2 switching unit [50] and, on switching unit side, check continuity between pins 2C25-AA32 and AA23 (AA32 and AA15), and between pins 2C25-AA33 and AA22 (AA33 and AA16).

- OK → continue below
- NOT OK → Replace First Officer's FD1/FD2 switching unit [50].

Replace AP/FD pitch computer No.1 [2] (No.2 [5]).
Connect First Officer's FD1/FD2 switching unit [50].
If the pitch bar is still removed on First Officer's ADI, replace W & LD computer No.1 [34] (No.2 [35]).

Chart 120

```
**************************************
* ON CAPTAIN'S ADI, THE PITCH BAR    *
* IS NOT CENTRED                     *
**************************************



-----------------------------------------------------
| Engage FD2 (FD1) pitch.                            |
| Place Captain's FD1/FD2 switch in FD2 (FD1)        |
| position.                                          |
| On Captain's ADI, the pitch bar is centred.        |
-----------------------------------------------------
     |   |
     |   |     ---------------------------------------------------
    YES  |-NO------| Replace Captain's ADI [27].                      |
     |              ---------------------------------------------------
     |
-----------------------------------------------------
| Replace AP/FD pitch computer No.1 [2] (No.2 [5]). |
-----------------------------------------------------
```

Chart 121

```
*************************************
* ON FIRST OFFICER'S ADI,           *
* THE PITCH BAR IS NOT CENTRED.     *
*************************************


-----------------------------------------------------
| Engage FD2 (FD1) switch.                          |
| Place First Officer's FD1/FD2 switch [46]         |
| in FD2 (FD1) position.                            |
| On First Officer's ADI, the pitch bar is centred. |
-----------------------------------------------------
    |   |
    |   |      ---------------------------------------------------
   YES  |-NO------| Replace First Officer's ADI [28].              |
    |              ---------------------------------------------------
    |
-----------------------------------------------------
| Replace AP/FD pitch computer No.1 [2] (No.2 [5]). |
-----------------------------------------------------
```

Chart 122

```
*************************************
* ON CAPTAIN'S HSI,                 *
* HDG INDICATION IS NOT VISIBLE     *
*************************************


----------------------------------------------------
| Trip circuit breaker 1F26 [51].                  |
| HDG indication is visible.                       |
----------------------------------------------------
    |   |
    |   |                 ---------------------------------------------------
    |   |                 | Replace Track Heading unit No.1 [53]             |
   YES  |-NO-------------| Repeat Test.                                     |
    |                     | If HDG indication does not appear,               |
    |                     | replace Captain's HSI [55].                      |
    |                     ---------------------------------------------------
    |
----------------------------------------------------
| Replace AFCS control unit [1].                   |
----------------------------------------------------
```

Chart 123

```
*************************************
* ON FIRST OFFICER'S HSI,           *
* HDG INDICATION IS NOT VISIBLE.    *
*************************************


----------------------------------------------------
| Trip circuit breaker 2F26 [52].                  |
| HDG indication is visible.                       |
----------------------------------------------------
    |   |
    |   |        ---------------------------------------------------
    |   |        | Replace Track Heading unit No.2 [54].           |
   YES  |-NO-----| Repeat check.                                   |
    |            | If HDG indication does not appear,              |
    |            | replace First Officer's HSI [56].               |
    |            ---------------------------------------------------
    |
----------------------------------------------------
| Replace AFCS control unit [1].                   |
----------------------------------------------------
```

Chart 124

FD1 (FD2) SWITCH DISENGAGES.

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART NO.
MULTIMETER	

Engage ITEM side 1 (side 2) in IFM function.
Cancel previous failure warnings as necessary.
(Ref. Prepare).
Engage FD1 (FD2) switch, select HDG/TRK mode.
FD1 (FD2) switch disengages.
Stored data displayed are :

- HSI →
  - Replace Track Heading unit No.1 [53] (No.2 [54])
    Engage FD1 (FD2) switch and select HDG/TRK mode.
    FD1 (FD2) switch remains engaged.
    - NO →
      - Disconnect Track Heading unit No.1 [53] (No.2 [54]) and, on aircraft side, measure voltage between pins 1F142-A15 and A19 (2F142-A15 and A19).
        Voltage measured is +28V
        - YES → Replace AFCS control unit [1].
        - NO → Replace Captain's (First Officer's) HSI [55] ([56])
- AP.A or FD.A → Replace AP/FD azimuth computer No.1 [3] No.2 [6]).

Chart 125

ON CAPTAIN'S ADI THE ROLL BAR IS OUT-OF-VIEW

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART NO.
MULTIMETER	

Engage FD2 (FD1) switch.
Place Captain's FD1/FD2 switch [45] in FD2 position.
On Captain's ADI, the roll bar is centred.

- NO → Replace Captain's ADI [27].
- YES ↓

Place Captain's FD1/FD2 switch in FD1 (FD2) position.
Disconnect Captain's FD1/FD2 switching unit [49] and, on switching unit side, check continuity between pins 1C25-AA45 and AA28 (AA45 and AA37) and between pins 1C25-AA46 and AA29 (AA46 and AA36)

- CONTINUITY → Replace AP/FD azimuth computer No.1 [3] (No.2 [6]) Repeat check. If the roll bar remains out of-view on Captain's ADI, replace W & LD computer No.1 [34] (No.2 [35]).
- DISCONTINUITY → Replace Captain's FD1/FD2 switching unit [49].

Chart 126

```
*************************************-------------------------------
* ON FIRST OFFICER'S ADI             *| GROUND EQUIPMENT REQUIRED    |
* THE ROLL BAR IS OUT-OF-VIEW.       *|------------------------------|
*************************************| DESCRIPTION        PART NO.  |
                                      |------------------------------|
                                      | MULTIMETER                   |
                                      --------------------------------

-------------------------------------------------------------
| Engage FD2 (FD1) switch.                                  |
| Place First Officer's FD1/FD2 switch in FD2 (FD1)         |
| position.                                                 |
| On First Officer's ADI, the roll bar is centred.          |
-------------------------------------------------------------
     |    |
     |    |      ------------------------------------------------------
    YES   |-NO------| Replace First Officer's ADI [28].                 |
     |           ------------------------------------------------------
     |
-------------------------------------------------------------
| Place First Officer's FD1/FD2 switch in FD1 (FD2)         |
| position.                                                 |
| Disconnect First Officer's FD1/FD2 switching unit         |
| [50], and on switching unit side, check                   |
| continuity between pins 2C25-AA45 and AA37                |
| (AA45 and AA28), and pins 2C25-AA46 and AA36              |
| (AA46 and AA29).                                          |
-------------------------------------------------------------
     |                                      |
     |                                      |
  CONTINUITY                          DISCONTINUITY
     |                                      |
     |                                      |
--------------------------------    ----------------------------------
| Replace AP/FD azimuth        |    | Replace First Officer's FD1/FD2 |
| computer No.1 [3]            |    | switching unit [50].            |
| (No.2 [6]).                  |    ----------------------------------
| Repeat check                 |
| If the roll bar remains      |
| out-of-view on First         |
| Officer's ADI, replace       |
| W & LD computer No.1 [34]    |
| (No.2 [35]).                 |
--------------------------------
```

Chart 127

```
*************************************
* ON CAPTAIN'S ADI,                 *
* THE ROLL BAR IS NOT CENTRED       *
*************************************


-----------------------------------------------------
| Engage FD2 (FD1) switch.                          |
| Place Captain's FD1/FD2 switch [45] in FD2 (FD1)  |
| position.                                         |
| On Captain's ADI, the roll bar must be centred.   |
-----------------------------------------------------
    |   |
    |   |     -----------------------------------------------------
   YES  |-NO------| Replace Captain's ADI [27].                   |
    |             -----------------------------------------------------
    |
-----------------------------------------------------
| Replace AP/FD azimuth computer No.1 [3] (No.2 [6])|
-----------------------------------------------------
```

Chart 128

```
*************************************
* ON FIRST OFFICER'S ADI,           *
* THE ROLL BAR IS NOT CENTRED       *
*************************************
```

```
-----------------------------------------------------
| Engage FD2 (FD1) switch                           |
| Place First Officer's FD1/FD2 switch [46] in FD2  |
| (FD1) position.                                   |
| On First Officer's ADI, the roll bar is centred.  |
-----------------------------------------------------
    |   |
    |   |       ---------------------------------------------------
   YES  |-NO------| Replace First Officer's ADI [28].              |
    |               ---------------------------------------------------
    |
-----------------------------------------------------
| Replace AP/FD azimuth computer No.1 [2] (No.2 [6])|
-----------------------------------------------------
```

Chart 129

```
**************************************
* THE ROLL BARS DO NOT MOVE.         *
**************************************



-----------------------------------------------------
| Engage AP1 (AP2) switch. Select HDG/TRK mode.     |
| Slightly rotate HDG/TRK1 (HDG/TRK2) push-pull Knob|
| Elevons deflect.                                  |
-----------------------------------------------------
    |   |
    |   |     ---------------------------------------------------
    NO  |-YES-----| Replace AP/FD azimuth computer No.1 [3]      |
    |             | (No.2 [6]).                                  |
    |             ---------------------------------------------------
    |
-----------------------------------------------------
| Replace Track Heading unit No.1 [53] (No.2 [54]). |
| Repeat check.                                     |
| If the roll bars do not move on operation of      |
| HDG-TRK1 (HDG-TRK2) push-pull knob replace        |
| AP/FD azimuth computer No.1 [3] (No.2 [6]).       |
-----------------------------------------------------
```

Chart 130

```
**************************************
* FD1 (FD2) SWITCH DOES NOT DISENGAGE*
**************************************


-----------------------------------------------------
| On Captain's (First Officer's) HSI,               |
| HDG flag is present during test.                  |
-----------------------------------------------------
    |   |
    |   |   ------------------------------------------------------
   YES  |-NO------| Replace Captain's (First Officer's) HSI [55]  |
    |             | ([56]).                                       |
    |             ------------------------------------------------------
    |
-----------------------------------------------------
| Replace Track Heading unit No.1 [53] (No.2 [54]). |
| Engage FD1 (FD2) in HDG/TRK mode.                 |
| Repeat check.                                     |
| If FD1 (FD2) remains engaged, replace AP/FD       |
| azimuth computer No.1 [3] (No.2 [6]).             |
-----------------------------------------------------
```

Chart 131

```
**************************************
* FD1 (FD2) SWITCH DISENGAGES.       *
**************************************



-----------------------------------------------------
| The following warnings are triggered :            |
| - INS on master warning panel (4-211)             |
| - INS1 (INS2) on First Officer's instrument panel |
-----------------------------------------------------
    |   |
    |   |          --------------------------------------------------
   YES  |-NO------| Replace AP/FD azimuth computer No.1 [3]          |
    |              --------------------------------------------------
    |
-----------------------------------------------------
| Ref. 34-45-00, Trouble Shooting.                  |
-----------------------------------------------------
```

Chart 132

```
**************************************
* THE ROLL BARS ARE NOT MOVING.      *
**************************************



 ----------------------------------------------------
| On Captain's (First Officer's) HSI, the lateral    |
| deviation bar shows an INS course.                 |
 ----------------------------------------------------
      |    |
      |    |    -----------------------------------------------------
   YES    |-NO------| Ref. 34-45-00, Trouble Shooting.                    |
      |              -----------------------------------------------------
      |
 ----------------------------------------------------
| Replace AP/FD azimuth computer No.1 [3]            |
| (No.2 [6]).                                        |
| Repeat check                                       |
| If the roll bars are not moving, replace Inertial  |
| Navigation unit No.1 [42] (No.2 [43]).             |
 ----------------------------------------------------
```

Chart 133

VOR/LOC MODE SELECTION PUSH-BUTTON DOES NOT ILLUMINATE HDG/TRK MODE SELECTION PUSH-BUTTON AND VOR/LOC PRIME INDICATOR LIGHT REMAIN ILLUMINATED.	GROUND EQUIPMENT REQUIRED	
	DESCRIPTION	PART NO.
	MULTIMETER	

On Captain's (First Officer's) HSI, during check :
- The lateral deviation bar moves
- The flag NAV (5 points) is not visible.

On both RMIs
- The VOR1 flag is not present
- VOR1 pointer moves accordingly.

NO → Ref. 34-55-00, Trouble Shooting

YES ↓

Replace AP/FD azimuth computer No.1 [3] (No.2 [6])
Repeat check.
If fault remains, disconnect RAD/INS switching unit No.1 [59] (No.2 [60]) and, on switching unit side, check continuity between pins 1F24-AA101 and AA105 (2F24-AA101 and AA105).

NO → Replace RAD/INS switching unit No.1 (No.2 [60]).

YES ↓

Replace VOR Receiver No.1 [61] (No.2 [62]).

Chart 134

```
*************************************
* THE ELEVONS DO NOT DEFLECT        *
*************************************


----------------------------------------------------
| On AFCS control unit, engage AT1 (AT2) switch.   |
| On AUTOTHROTTLE section, IAS HOLD mode selection |
| push-button illuminates                          |
| The AP system reverts to PITCH HOLD mode         |
| By means of ADC simulator, vary Ias speed.       |
| Throttle control levers move.                    |
----------------------------------------------------
    |   |
    |   |      ----------------------------------------------
   YES  |-NO------| Replace Air Data Computer No.1 [63]        |
    |             | (No.2 [64]).                               |
    |             ----------------------------------------------
    |
----------------------------------------------------
| Replace AP/FD pitch computer No.1 [2] (No.2 [5]). |
----------------------------------------------------
```

Chart 135

```
**************************************
* THE ELEVONS DO NOT DEFLECT         *
**************************************

-----------------------------------------------------
| On AFCS control unit, engage AT1 (AT2) switch.    |
| On AUTOTHROTTLE section, select MACH HOLD mode.   |
| - MACH HOLD mode selection push-button illuminates|
| - The AP system reverts to PITCH HOLD mode        |
|                                                   |
| By means of ADC simulator, vary MACH value.       |
|                                                   |
| - Throttle control levers move.                   |
-----------------------------------------------------
    |   |
    |   |    --------------------------------------------------
   YES  |-NO------| Replace Air Data computer No.1 [63]         |
    |             | (No.2 [64].                                 |
    |             --------------------------------------------------
    |
-----------------------------------------------------
| Replace AP/FD pitch computer No.1 [2]             |
| (No.2 [5]).                                       |
-----------------------------------------------------
```

Chart 136

```
***************************************
* THE PITCH BARS ARE NOT CENTRED OR   *
* DO NOT MOVE.                        *
***************************************
```

```
-------------------------------------------------------
| Engage ITEM side 1 (side 2) in TEST UNIT function   |
| Display AT indication and start Autothrottle        |
| computer test (Ref. Prepare)                        |
| On completion of Test, stored data displayed are :  |
-------------------------------------------------------
        |                         |
        |                         |
    AT PASS                   AT ACCL
        |                         |
        |                         |
        |         ----------------------------------------------------
        |         | Replace longitudinal accelerometer 1C183 [65]    |
        |         | (2C183 [66]).                                    |
        |         ----------------------------------------------------
        |
-------------------------------------------------------
| Replace AP/FD pitch computer No.1 [2].              |
| (No.2 [5]).                                         |
-------------------------------------------------------
```

Chart 137

```
**************************************
* FD1 (FD2) SWITCH DISENGAGES        *
**************************************


-----------------------------------------------------
| On Captain's (First Officer's) Vertical Speed     |
| Indicator, the warning flag is out-of-view.       |
-----------------------------------------------------
    |   |
    |   |    ---------------------------------------------------
   YES  |-NO------| Ref. 34-10-00, Trouble Shooting              |
    |            ---------------------------------------------------
    |
-----------------------------------------------------
| Replace AP/FD pitch computer No.1 [2] (No.2 [5])  |
-----------------------------------------------------
```

Chart 138

```
*************************************
* ON CAPTAIN'S (FIRST OFFICER'S) ADI *
* THE PITCH BAR IS NOT CENTRED.      *
*************************************



----------------------------------------------------
| On Captain's (First Officer's) Vertical Speed    |
| Indicator, the two pointers are facing           |
----------------------------------------------------
    |   |                  -----------------------------------------------------
   YES  |-NO------| Ref. 34-10-00, Trouble Shooting.                          |
    |                  -----------------------------------------------------
----------------------------------------------------
| Replace AP/FD pitch computer No.1 [2] (No.2 [5]). |
----------------------------------------------------
```

Chart 139

```
***************************************-------------------------------
* THE COMMANDED SPEED POINTER AND     *| GROUND EQUIPMENT REQUIRED   |
* THE PITCH BAR DO NOT MOVE           *|-----------------------------|
***************************************| DESCRIPTION       PART NO.  |
                                       |-----------------------------|
                                       | MULTIMETER                  |
                                       -------------------------------


-----------------------------------------------------
| Disconnect AFCS datum adjust unit [44] and, on    |
| datum adjust side, check continuity between pins  |
| C2 AK and AZ (C2BK and BZ) while holding          |
| AUTOPILOT NOSE UP-NOSE DOWN toggle switch         |
| in one of the 4 positions.                        |
-----------------------------------------------------
     |   |
     |   |    ---------------------------------------------------
    YES  |-NO------| Replace AFCS datum adjust unit [44]          |
     |              ---------------------------------------------------
     |
-----------------------------------------------------
| Replace Vertical Speed amplifier No.1 [67]        |
| (No.2 [68])                                       |
| Repeat check.                                     |
| If fault remains, replace AP/FD pitch computer    |
| No.1 [2] (No.2 [5]).                              |
-----------------------------------------------------
```

Chart 140

```
***********************************-------------------------------
* IN ONE OF THE FOUR POSITIONS OF    *| GROUND EQUIPMENT REQUIRED  |
* NOSE UP - NOSE DOWN TOGGLE SWITCH, *|----------------------------|
* THE COMMANDED SPEED POINTER AND    *| DESCRIPTION       PART NO. |
* THE PITCH BAR DO NOT MOVE.         *|----------------------------|
**************************************| MULTIMETER                 |
                                       ----------------------------

-----------------------------------------------------
| Disconnect AFCS datum adjust unit [44].           |
| On datum adjust unit side, check continuity       |
| between pins :                                    |
|                                                   |
| -X and L of socket C2-A (C2-B) when toggle switch |
|  is in either UP position, for failure in UP      |
|  direction.                                       |
|                                                   |
| -X and K of socket C2-A (C2-B) when toggle switch |
|  is in either DOWN position, for failure in DOWN  |
|  direction.                                       |
|                                                   |
| -Y and L of socket C2-A (C2-B) when toggle switch |
|  is in either slow position, for failure in a     |
|  slow position.                                   |
|                                                   |
| -Y and K of socket C2-A (C2-B) when toggle switch |
|  is in either fast position, for failure in a     |
|  fast position.                                   |
-----------------------------------------------------
     |   |
     |   |      ---------------------------------------------
    YES  |-NO------| Replace AFCS datum adjust unit [44].        |
     |            ---------------------------------------------
     |
-----------------------------------------------------
| Replace Vertical Speed amplifier No.1 [67]        |
| (No.2 [68]).                                      |
-----------------------------------------------------
```

Chart 141

```
*************************************
* FD1 (FD2) SWITCH REMAINS ENGAGED.  *
*************************************
```

```
--------------------------------------------------------
| On Captain's (First Officer's) Vertical Speed        |
| Indicator, the flag is visible.                      |
--------------------------------------------------------
    |   |
    |   |   ---------------------------------------------------
   NO   |-YES-----| Replace AP/FD pitch computer No.1 [2]        |
    |             | No.2 [5]).                                   |
    |             ---------------------------------------------------
    |
--------------------------------------------------------
| Replace Vertical Speed amplifier No.1 [67]           |
| (No.2 [68]).                                         |
--------------------------------------------------------
```

Chart 142

```
*************************************
* ALT HOLD MODE SELECTION PUSH-BUTTON*
* DOES NOT ILLUMINATE.              *
*************************************



---------------------------------------------------
| Proceed with check of Altitude Alert system     |
| as described in 22-10-00, Adjustment/Test,      |
| par. 2.T (8) to 2.T (13).                       |
| Altitude Alert system operates correctly.       |
---------------------------------------------------
    |   |
    |   |      ------------------------------------------------
    NO  |-Yes-----| Replace AP/FD pitch computer No.1 [2]        |
    |             | (No.2 [5]).                                 |
    |              ------------------------------------------------
    |
---------------------------------------------------
| Replace Captain's (First Officer's) altimeter   |
| [71] ([72]).                                    |
| Repeat check.                                   |
| If fault remains, replace AFCS control unit [1].|
---------------------------------------------------
```

Chart 143

```
*************************************
* THE ROLL BAR DOES NOT MOVE.       *
*************************************



----------------------------------------------------
| Select GLIDE mode.                                |
| By means of ground test unit, decrease LOC        |
| deviation until capture is initiated.             |
| - On Captain's (First Officer's) ADI, the roll    |
|   bar moves towards the right.                    |
----------------------------------------------------
     |   |
     |   |
     |   |       --------------------------------------------------
    NO   |-YES-----| Replace AP/FD azimuth computer No.1 [3]        |
     |             | (No.2 [6]).                                    |
     |             --------------------------------------------------
     |
----------------------------------------------------
| By means of ground test unit, increase LOC beam   |
| deviation.                                        |
| - On each W & LD indicator, the LOC beam deviation|
|   bar illuminates.                                |
----------------------------------------------------
     |   |
     |   |
     |   |       --------------------------------------------------
    YES  |- NO-----| Replace AP/FD azimuth computer No.1 [3]        |
     |             | (No.2 [6]).                                    |
     |             --------------------------------------------------
     |
----------------------------------------------------
| Replace ILS receiver No.1 [73] (ILS receiver No.2 |
| [74]).                                            |
----------------------------------------------------
```

Chart 144

FD1 (FD2) SWITCH DISENGAGES.

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART NO.
MULTIMETER	

Engage FD1 (FD2) switch and select VOR/LOC mode.
- VOR/LOC prime indicator light illuminates.
By means of ground test unit, decrease LOC deviation until capture is initiated.
- VOR/LOC selection mode push-button illuminates.

NO → Replace AP/FD azimuth computer No.1 [3] (No.2 [6]).

YES ↓

Disconnect RAD/INS No.1 [59] (No.2 [60]) switch, and on, switch side, check continuity between pins 1F24-AA106 and AA102 (2F24-AA106 and AA102).

CONTINUITY → Replace ILS receiver No.1 [73] (ILS receiver No.2 [74]).

DISCONTINUITY → Replace RAD/INS No.1 [59] (No.2 [60]) switch.

Chart 145

LOC CAPTURE IS NOT INITIATED

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART NO.
MULTIMETER	

Select BACK BEAM mode.
FD1 (FD2) switch remains engaged.

- YES → Replace AP/FD azimuth computer No.1 [3] (No.2 [6]).
- NO → Disconnect RAD/INS No.1 [59] (No.2 [60]) switch and, on switch side, check continuity between pins 1F24-AA106 and AA102 (2F24-AA106 and AA102)
  - CONTINUITY → Replace ILS receiver No.1 [73] (ILS receiver No.2 [74])
  - DISCONTINUITY → Replace RAD/INS No.1 switch [59] (No.2 [60]).

Chart 146

```
**************************************
* FD1 (FD2) SWITCH DISENGAGES.       *
**************************************


-----------------------------------------------------
| Engage FD1 (FD2) switch.                          |
| - PITCH HOLD mode selection push-button is        |
|   illuminated.                                    |
| By means of ILS simulator, increase GLIDE         |
| deviation to prevent initiation of Glide capture. |
| (Make certain that LOC deviation is null).        |
| - Select GLIDE mode.                              |
| - FD1 (FD2) switch remains engaged.               |
-----------------------------------------------------
    |   |
    |   |    --------------------------------------------------
   YES  |-NO------| Replace AP/FD azimuth computer No.1 [3]     |
    |             | (No.2 [6]).                                  |
    |             --------------------------------------------------
    |
-----------------------------------------------------
| Replace AP/FD pitch computer No.1 [2]             |
| (No.2 [5]).                                       |
-----------------------------------------------------
```

Chart 147

```
**************************************
* THE ROLL BAR IS NOT CENTRED        *
**************************************



-----------------------------------------------------
| On Captain's (First Officer's) HSI, the deviation |
| bar is centred.                                   |
-----------------------------------------------------
    |   |
    |   |        ----------------------------------------------------
   YES  |-NO------| Ref. 34-36-00, Trouble Shooting.                 |
    |            ----------------------------------------------------
    |
-----------------------------------------------------
| Replace AP/FD pitch computer No.1 [2] (No.2 [5]). |
| Repeat check.                                     |
| If fault remains, replace ILS Receiver No.1 [73]  |
| (ILS Receiver No.2 [74]).                         |
-----------------------------------------------------
```

Chart 148

Printed in England

```
*************************************
* LAND MODE SELECTION PUSH-BUTTON   *
* DOES NOT ILLUMINATE.              *
*************************************


-----------------------------------------------------
| Disengage Autothrottle system, and push the four  |
| throttle control levers towards max thrust stop   |
| -On AFCS control unit, the GO AROUND caption light|
|  illuminates.                                     |
-----------------------------------------------------
     |   |
     |   |     ---------------------------------------------------
    NO   |-YES-----| Replace AP/FD azimuth computer No.1 [3]     |
     |             | (No.2 [6]).                                 |
     |             ---------------------------------------------------
     |
-----------------------------------------------------
| Replace AP/FD azimuth computer No.1 [3] (No.2 [6])|
| Repeat check.                                     |
| If fault remains, replace AP/FD pitch computer    |
| No.1 [2] (No.2 [5]).                              |
-----------------------------------------------------
```

Chart 149

```
*************************************
* FD1 (FD2) SWITCH DISENGAGES       *
*************************************



-----------------------------------------------------
| Engage FD1 (FD2) switch.                          |
| -PITCH HOLD mode selection push-button is         |
|  illuminated.                                     |
| By means of the ILS simulator, increase GLIDE     |
| deviation in order to prevent initiation of       |
| Glide capture. (Make certain that LOC deviation   |
| is null.)                                         |
| Select LAND mode.                                 |
| -VOR/LOC mode selection push-button illuminates.  |
| -FD1 (FD2) switch remains engaged.                |
-----------------------------------------------------
    |   |
    |   |
    |   |   ---------------------------------------------------
   YES  |-NO------| Replace AP/FD azimuth computer No.1 [3]      |
    |             | (No.2 [6]).                                  |
    |               ---------------------------------------------------
    |
-----------------------------------------------------
| Replace AP/FD pitch computer No.1 [2] (No.2 [5]). |
-----------------------------------------------------
```

Chart 150

```
**************************************
* AP1 (AP2) SWITCH DOES NOT REMAIN   *
* ENGAGED.                           *
**************************************
```

```
-----------------------------------------------------
| Engage side 1 (side 2) ITEM in IFM function.       |
| Cancel previous failures stored as necessary       |
| (Ref. Prepare).                                    |
| Engage FD1 (FD2) switch.                           |
| Select LAND mode.                                  |
| After Glide Capture and LOC track phases,          |
| engage AP1 (AP2) switch.                           |
| The switch disengages.                             |
| Read stored data displayed :                       |
-----------------------------------------------------
        |                            |
        |                            |
      AP.A                         AP.P
        |                            |
        |             ------------------------------------------------
        |             | Replace AP/FD pitch computer No.1 [2]        |
        |             | (No.1 [5]).                                  |
        |             ------------------------------------------------
        |
-----------------------------------------------------
| Replace AP/FD azimuth computer No.1 [3] (No.2 [6])|
-----------------------------------------------------
```

Chart 151

```
*************************************
* ON COMPASS COUPLER UNIT No.1 (No.2)*
* DG INDICATOR LIGHT DOES NOT        *
* ILLUMINATE                         *
*************************************
```

```
------------------------------------------------------
| Replace Compass Coupler Unit No.1 [57] (No.2 [58])|
| Repeat check.                                     |
| If fault remains, replace AP/FD azimuth computer  |
| No.1 [3] (No.2 [6]).                              |
------------------------------------------------------
```

Chart 152

Printed in England

ON CAPTAIN'S ADI, THE YAW POINTER DOES NOT APPEAR.

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART NO.
MULTIMETER	

Engage FD2 (FD1) switch.
Place Captain's (First Officer's) FD1/FD2 switch in FD2 (FD1) position.
On Captain's ADI, the yaw pointer is centred.

- NO: Replace Captain's ADI [27].
- YES:

Place Captain's FD1/FD2 switch in FD1 (FD2) position.
Disconnect Captain's FD1/FD2 switching unit [49].
On switching unit side, check continuity between pins 1C25-AA58 and AA41 (AA58 and AA51), and pins 1C25-AA59 and AA42 (AA59 and AA50).

- DISCONTINUITY: Replace Captain's FD1/FD2 switching unit [49].
- CONTINUIY:

Replace AP/FD azimuth computer No.1 [3] (No.2 [6])
Repeat check.
If fault remains, replace W & LD computer No.1 [54] (No.2 [35]).

Chart 153

ON FIRST OFFICER'S ADI THE YAW POINTER DOES NOT APPEAR

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART NO.
MULTIMETER	

Engage FD2 (FD1) switch and place First Officer's FD1/FD2 switch [46] in FD2 (FD1) position.
On First Officer's ADI, the yaw pointer is centred

- YES: go to next step
- NO: Replace First Officer's ADI [28].

Place First Officer's FD1/FD2 switch in FD1 (FD2) position.
Disconnect First Officer's FD1/FD2 switching unit [50].
On switching unit side, check continuity between pins 2C25-AA58 and AA51 (AA58 and AA41) and between pins 2C25-AA59 and AA50 (AA59 and AA42)

- CONTINUITY: go to next step
- DISCONTINUITY: Replace First Officer's FD1/FD2 switch [50].

Replace AP/FD azimuth computer No.1 [3] (No.2 [6])
Repeat check.
If fault remains, replace W & LD computer No.1 [34] (No.2 [35]).

Chart 154

```
***************************************
* ON CAPTAIN'S ADI,                   *
* THE YAW POINTER IS NOT CENTRED      *
***************************************


-------------------------------------------------------
| Engage FD2 (FD1) switch                             |
| Place Captain's FD1/FD2 switch [45] in FD2 (FD1)    |
| position.                                           |
| On Captain's ADI, the yaw pointer is centred.       |
-------------------------------------------------------
     |   |
     |   |
     |   |    ---------------------------------------------------
    YES  |-NO------| Replace Captain's ADI.                      |
     |              ---------------------------------------------------
     |
     |
-------------------------------------------------------
| Replace AP/FD azimuth computer No.1 [3]             |
| (No.2 [6]).                                         |
-------------------------------------------------------
```

Chart 155

```
***************************************
* ON FIRST OFFICER'S ADI,             *
* THE YAW POINTER IS NOT CENTRED.     *
***************************************


-------------------------------------------------------
| Engage FD2 (FD1) switch                             |
| Place First Officer's FD1/FD2 switch in FD2 (FD1)   |
| position.                                           |
| On Captain's ADI, the yaw pointer is centred.       |
-------------------------------------------------------
     |   |
     |   |
     |   |   --------------------------------------------------
    YES  |-NO------| Replace First Officer's ADI [28]          |
     |               --------------------------------------------------
     |
-------------------------------------------------------
| Replace AP/FD azimuth computer No.1 [2] (No.2 [6])|
-------------------------------------------------------
```

Chart 156

```
*************************************
* FD1 (FD2) SWITCH DISENGAGES.      *
*************************************



----------------------------------------------------
| Replace AP/FD azimuth computer No.1 [3]          |
| (No.2 [6]). Repeat check.                        |
| FD1 (FD2) switch disengages.                     |
----------------------------------------------------
        |
        |       ------------------------------------------------
        |       | Carry out check of emergency flight control  |
        |       | system by pressing the TEST button at the    |
        |-YES---| junction of First Officer's handwheel choke  |
                | -EMERG CONT switch caption light illuminates |
                |  entirely (all bulbs).                       |
                ------------------------------------------------
                      |                         |
                      |                         |
                     YES                        NO
                      |                         |
                      |                         |
---------------------------------   ------------------------------
| Replace LG relays G308 [77]   |   | Replace LG relay G303 [75] |
| (G317 [78]).                  |   | (G312 [76]).               |
| Repeat check.                 |   | Repeat check.              |
| If fault remains,             |   | If fault remains,          |
| ref. 32-61-00, Trouble        |   | ref. 32-61-00, Trouble     |
| Shooting.                     |   | Shooting.                  |
---------------------------------   ------------------------------
```

Chart 157

```
************************************
* ON CAPTAIN'S ADI, THE YAW POINTER  *
* REMAINS STEADY.                    *
************************************


--------------------------------------------------
| Engage FD2 (FD1) switch.                        |
| Place Captain's FD1/FD2 switch [45] in FD2 (FD1)|
| position.                                       |
| On Captain's ADI, the yaw pointer moves.        |
--------------------------------------------------
    |         |
    |         |        ------------------------------------------
   YES        |-NO------| Replace Captain's ADI [27].            |
    |                  ------------------------------------------
    |
--------------------------------------------------
| Replace AP/FD azimuth computer No.1 [3] (No.2 [6])|
--------------------------------------------------
```

Chart 158

```
*************************************
* ON FIRST OFFICER'S ADI,           *
* THE YAW POINTER REMAINS STEADY.   *
*************************************



----------------------------------------------------
| Engage FD2 (FD1) switch.                           |
| Place First Officer's FD1/FD2 switch               |
| in FD2 (FD1) position.                             |
| On First Officer's ADI, the yaw pointer moves.     |
----------------------------------------------------
    |   |
    |   |     -------------------------------------------------
   YES  |-NO------| Replace First Officer's ADI [28].          |
    |             -------------------------------------------------
    |
----------------------------------------------------
| Replace AP/FD azimuth computer No.1 [2]            |
| (No.2 [6]).                                        |
----------------------------------------------------
```

Chart 159

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	WIRING DIAGRAM
[1] AFCS control unit		5-211	C1	Glareshield instrument panel	22-11-21 R/I	22-10-02 22-10-07
[2] AP/FD pitch computer No.1	215BS	4-215	1C12	Electronics rack-LH	22-12-11 R/I	22-10-0X 22-11-0X 22-12-0X
[3] AP/FD azimuth computer No.1	215BS	4-215	1C13	Electronics rack-LH	22-13-11 R/I	22-10-0X 22-11-0X 22-13-0X
[4] Auto-throttle computer No.1	215BS	4-215	1C171	Electronics rack-LH	22-31-11 R/I	22-31-04
[5] AP/FD pitch computer No.2	216BS	4-216	2C12	Electronics rack-RH	22-12-11 R/I	22-10-0X 22-11-0X 22-12-0X
[6] AP/FD azimuth computer No.2	216 BS	4-216	2C13	Electronics rack-RH	22-13-11 R/I	22-10-0X 22-11-0X 22-13-0X
[7] Auto-throttle computer No.2	216BS	4-216	2C171	Electronics rack-RH	22-31-11 R/I	22-31-04
[8] AP instinctive disconnect switch		8-211	1C14 2C14	Captain's handwheel	22-11-36 R/I	22-11-02 22-11-07
[9] AP instinctive disconnect switch		4-212	1C15 2C15	F/O handwheel	22-11-36 R/I	22-11-02 22-11-07
[10] Pitch Relay Jack Sensor	121FB		C3		22-12-61 R/I	22-12-01
[11] Roll Relay Jack Sensor	121FB		C4		22-13-61 R/I	22-13-01

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	WIRING DIAGRAM
[12] Yaw Relay Jack Sensor	121FB		C5		22-13-61 R/I	22-13-01
[13] Pitch Relay Jack	121FB		C6		27-34-14 R/I	22-12-01
[14] Roll Relay Jack	121FB		C8		27-14-12 R/I	22-13-01
[15] Yaw Relay Jack	121FB		C10		27-24-12 R/I	22-13-01
[16] Autostab computer No.1	215BS	8-215	1C31	Electronics rack-LH	22-22-11 R/I	22-12-01 22-13-01
[17] Autostab computer No.2	216BS	8-216	2C31	Electronics rack-RH	22-22-11 R/I	22-12-01 22-13-01
[18] Autopilot force limiter	121FB		C7		27-31-17 R/I	22-11-02 22-11-07
[19] Autopilot force limiter	121FB		C9		27-11-19	22-11-02 22-11-07
[20] Autopilot force limiter	121FB		C11		27-21-16	22-11-02 22-11-07
[21] Circuit breaker		1-213	1C17	Map Ref. Q 13	24-50-00 R/I	22-10-01
[22] Circuit breaker		5-213	2C17	Map Ref. A 11	24-50-00 R/I	22-10-06
[23] Circuit breaker		13-215	1C18	Map Ref. A 5	24-50-00 R/I	22-10-01
[24] Circuit breaker		13-216	2C18	Map Ref. F 18	24-50-00 R/I	22-10-06

**ON A/C 001-001,

[25] Circuit breaker		13-215	1C20	Map Ref. F 5	24-50-00 R/I	22-10-01

R **ON A/C 002-007,

[25] Circuit breaker		2-213	1C20	Map Ref. C 5	24-50-00 R/I	22-10-01
[26] Circuit breaker		13-216	2C20	Map Ref. A 17	24-50-00 R/I	22-10-06
[27] Captain's ADI		2-211	1F23	Captain's Inst-panel	34-00-00 R/I	22-10-01
[28] F/O ADI		2-212	2F23	F/O Inst-panel	34-00-00 R/I	22-10-06
[29] Safety flight control computer No.1	215BS	6-215	1C650	Electro-nics rack-LH	27-39-11 R/I	22-11-02
[30] Safety flight control computer No.2	216BS	6-216	2C650	Electro-nics rack-RH	27-39-11 R/I	22-11-07
[31] Inertial signal comparator unit	123BB	26-123	F1		34-00-00 R/I	
[32] Captain's W & LD indicator No.1		2-211	1C189	Captain's instrument panel	22-41-81 R/I	
[33] F/O W & LD indicator No.2		2-212	2C189	F/O instrument panel	22-41-81 R/I	
[34] Warning & Landing Display computer No.1	215BS	4-215	1C188	Electro-rack-LH	22-41-11 R/I	
[35] Warning & Landing Display computer No.2	216BS	4-216	2C188	Electro-nics rack-RH	22-41-11 R/I	
[36] Circuit breaker		1-213	1C192	Map Ref. P 13	24-50-00 R/I	22-41-01
[37] Circuit breaker		1-213	1C193	Map Ref. P 14	24-50-00 R/I	22-41-01
[38] Circuit breaker		5-213	2C192	Map Ref. B 11	24-50-00 R/I	22-41-01

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	WIRING DIAGRAM
[39] Circuit breaker		5-213	2C193	Map Ref. B 12	24-50-00 R/I	22-41-01
[40] Circuit breaker		2-213	1C191	Map Ref. F 4	24-50-00 R/I	22-41-01
[41] Circuit breaker		13-216	2C191	Map Ref. F 16	24-50-00 R/I	22-41-01
[42] Inertial Navigation unit No.1	123BB	27-123	1F8		34-00-00 R/I	22-12-0X 22-13-0X
[43] Inertial Navigation unit No.2	123BB	27-123	2F8		34-00-00	22-12-0X 22-13-0X
[44] AFCS Datum adjust unit		7-211	C2		22-11-11 R/I	22-10-0X 22-11-0X 22-12-0X 22-13-0X
[45] Captain's FD1/FD2 switch		2-211	1C26	Captain's inst-panel		22-11-01
[46] F/O FD1/FD2 switch		2-212	2C26	F/O inst-panel		22-11-06
[47] Circuit breaker		1-213	1C27	Map Ref.	24-50-00 R/I	22-11-01
[48] Circuit breaker		5-213	2C27	Map Ref.	24-50-00 R/I	22-11-06
[49] Captain's FD1/FD2 switching unit		4-215	1C25	Electro-nics rack-LH		22-11-01 22-11-01
[50] F/O FD1/ FD2 switching unit		4-216	2C25	Electro-nics rack-RH		22-11-06
[51] Circuit breaker		1-213	1F26	Map Ref. G 17	24-50-00 R/I	34-55-00

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	WIRING DIAGRAM
[52] Circuit breaker		15-216	2F26	Map Ref. E 21	24-50-00 R/I	34-55-00
[53] Track heading unit No.1			1F142	Electronics rack	34-00-00 R/I	34-55-00
[54] Track heading unit No.2			2F142	Electronics rack	34-00-00 R/I	34-55-00
[55] Captain's HSI		2-211	1F22	Captain's inst-panel	34-00-00 R/I	34-55-00
[56] F/O HSI		2-212	2F22	F/O inst-panel	34-00-00 R/I	34-55-00
[57] Compass coupler unit No.1	123BB	26-123	1F126		34-00-00 R/I	34-21-00
[58] Compass coupler unit No.2	123BB	26-123	2F126		34-00-00 R/I	34-21-00
[59] Captain's RAD/INS switching unit		7-215	1F24	Electronics rack-LH	34-00-00 R/I	22-13-02
[60] F/O RAD/INS switching unit		5-216	2F24	Electronics rack-RH	34-00-00 R/I	22-13-07
[61] VOR receiver No.1		7-215	1R24	Electronics rack-LH	34-00-00 R/I	22-13-01
[62] VOR receiver No.2		5-216	2R24	Electronics rack-RH	34-00-00 R/I	22-13-06
[63] Air data computer No.1		6-215	1F71	Electronics rack-LH	34-00-00 R/I	22-12-01

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	MANUAL REF. WIRING DIAGRAM
[64] Air data computer No.2		6-216	2F71	Electro-nics rack-RH	34-00-00 R/I	22-12-06
[65] Longitudi-nal accelenome-ter No.1	123AB	12-123	1C183		22-31-62 R/I	22-31-03
[66] Longitudi-nal accelenome-ter No.2	123AB	12-123	2C183		22-31-62 R/I	22-31-07
[67] Vert speed amplifier No.1		1-215	1F96		34-00-00 R/I	34-11-01
[68] Vert speed amplifier No.2		1-216	2F96		34-00-00 R/I	34-11-06
[69] Vert speed indicator No.1		2-211	1F85	Captain's inst-panel	34-00-00 R/I	22-12-01
[70] Vert speed indicator No.2		2-212	2F85	F/O inst-panel	34-00-00 R/I	22-12-06
[71] Captain's altimeter		2-211	1F79	Captain's inst-panel	34-00-00 R/I	22-11-04
[72] F/O altimeter		2-212	2F79	F/O inst-panel	34-00-00 R/I	22-11-04
[73] ILS receiver No.1		7-215	1R37		34-00-00 R/I	22-13-01
[74] ILS receiver No.2		5-216	2R37		34-00-00 R/I	22-13-06
[75] Landing gear relay		2-123	G303		32-00-00 R/I	32-61-06
[76] Landing gear relay		3-123	G312		32-00-00 R/I	32-61-06
[77] Landing gear relay		3-123	G308		32-00-00 R/I	32-61-06

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	WIRING DIAGRAM
[78] Landing gear relay		3-123	G317		32-00-00 R/I	32-61-06

Component Identification
Table 101

AUTOPILOT - SERVICING

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

1. General

The purpose of this topic is to simplify work preparation for AP/FD test.
The work preparation is described for :

A. AP 1 engagement

B. FD 1 engagement

C. AP 2 engagement

D. FD 2 engagement

E. AP 1 or AP 2 engagement

F. Engagement of both FD's

Therefore it will be referred to for the various AP/FD tests.

NOTE : This description consists of a list of the required steps for AP/FD engagement, in basic modes only.

2. AP 1 Engagement

A. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	

B. Prepare

(1) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
INS COMPTR SUP & IND	1-213	F 5	G15
ATT-INS 1ST PLT SW SUP		1F 13	G16
AUDIO WARN SYS SUP		W 371	M21
MWS		W 252	N21
ADC 28V SUP		1F 74	P12
WARN & LDG DISPLAY 1 SUP 1		1C 192	P13
WARN & LDG DISPLAY 1 SUP 2		1C 193	P14
TRIM 1 CONT		1C 161	Q11
AP/FD SYS 1 CONT		1C 17	Q13
SAFETY FLT CONT No. 1 SUP		1C 651	S20
INS COMPTR SUP 2	2-213	F 3	A 6
LAT ACCELMTR 1 26V SUP		1C 42	A 4
AP/FD SYS 1 SUP		1C 20	C 5
AUTO STAB 1 COMP SUP		1C 37	E 5
ADC 1 115V SUP		1F 73	F 3
LDG DISPLAY SYS 1 SUP		1C 191	F 4
INS COMPTR SUP 1		F 4	F 7
COMPASS COUPLER 1 SUP		1F 130	F 8
AP/FD COMP 1 CONT	13-215	1C 18	A 5
AFCS MODE SYS 1 LTS SUP		1C 273	B 5
TRIM COMP 1 SUP		1C 162	C 5
TRIM SYNCHRO SYS 1 SUP		1C 163	E 5
SAFETY FLT CONT COMP No. 1 115V SUP		1C 652	E 6
SAFETY FLT CONT COMP No. 1 26V SUP		1C 653	F 6

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
INS COMPTR SUP 3	13-216	F 2	B15

(2) On panel 2-213, set circuit breaker X 355 map ref. H2.

(3) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(4) At Flight Engineer's station, on EQUIPMENT BAY COOLING panel, make certain that electronics rack ventilation is in operation (Ref. 21-21-00, Servicing)

(5) Set flight control system in Blue or Green electrical mode (Ref. 27-00-00, Servicing).

(6) On Captain's instrument panel, make certain that ATT INS 1/INS 3 switch is in INS 1 position.

(7) Energize INS 1 (Ref. 34-45-00, Adjustment/Test).

NOTE : AD/FD 1 will engage only when G flag has disappeared from associated ADI.

(8) At Flight Engineer's station, on SYS 1 COMPASS control unit, make certain that DG-MAG switch is in MAG position.

(9) On centre console

(a) On ADC control panel, side 1 :

(a1) Make certain that TEST selector switch is in NORM position.

(a2) Place ON-OFF switch in ON position.

NOTE : If ADC 1 caption light illuminates, reset by pressing caption light, which must extinguish.

(b) On AFCS datum adjust unit, make certain that TURN knob is in centre position and that AUTOPILOT NOSE UP-NOSE DOWN toggle switch is in neutral position.

(10) On ceiling panel :

(a) On ANTISTALL SYSTEM control unit place switch 1 in ON position.

(a1) SYST 1 FAIL warning light must illuminate.

(b) On AUTO STAB No. 1 control unit, engage the three PITCH, ROLL and YAW switches.

(b1) The three switches must remain engaged.

(b2) SYS 1 FAIL warning light must extinguish.

(c) On ELECTRIC TRIM control unit, engage switch 1.

(c1) The switch must remain engaged.

C. Tests

(1) On AFCS control unit, engage AP 1 switch.

(a) The switch must remain engaged.

(b) AP 1 green indicator light must illuminate.

(c) PITCH HOLD and HDG HOLD push-buttons must illuminate.

(2) Manually disengage AP 1 switch and press either AP warning light on either W & LD indicator.

D. Close-Up

(1) On ceiling panel

(a) On AUTO STAB No. 1 control unit, disengage PITCH, ROLL and YAW switches.

(b) On ELECTRIC TRIM control unit, disengage switch 1.

(c) Place ANTI STALL SYSTEM switch side 1 in OFF position.

(2) On centre console, on ADC control panel, place ADC1 ON-OFF switch in OFF position.

(3) De-energize INS 1 (Ref. 34-45-00, Adjustment/Test).

(4) On master warning panel, press then release LIGHTS TEST CANCEL switch to cancel warnings.

(5) Carry out the close-up required for flight control operation (Ref. 27-00-00, Servicing).

(6) Disconnect electrical ground power unit and de-energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(7) On panel 2-213, trip safety and tag circuit breaker X355, map ref. H2.

3. FD 1 Engagement

A. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	

B. Prepare

(1) Carry out work preparation required for AP 1, but without energizing flight controls.

(2) On panel 1-213, check that circuit breaker 1C27, map reference Q15 is set.

(3) On Captain's instrument panel, make certain that FD 1/FD 2 switch is in FD 1 position.

(4) On Captain's attitude director indicator (ADI) check that red FD flag is not visible and that FD 1 annunciator is visible.

C. Tests

(1) On AFCS control unit, engage FD 1 switch.

(a) The switch must remain engaged.

(b) PITCH HOLD push-button must illuminate.

(c) On Captain's ADI, the pitch bar must appear.

(2) Disengage FD 1 switch.

(a) PITCH HOLD push-button must extinguish.

(b) On Captain's ADI, the pitch bar must disappear.

D. Close-Up

(1) Carry out close-up required for AP 1 engagement.

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4. AP 2 Engagement

A. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	

B. Prepare

(1) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
INS COMPTR SUP & IND	1-213	F 5	G15
TRIM 1 CONT		1C 161	Q11
INS COMPTR SUP 2	2-213	F 3	A 6
INS COMPTR SUP 1		F 4	F 7
AP/FD SYS 2 CONT	5-213	2C 17	A11
WARN & LDG DISPLAY 2 SUP 1		2C 192	B11
WARN & LDG DISPLAY 2 SUP 2		2C 193	B12
AUDIO WARN SYS SUP 2		W 372	C17
SAFETY FLT CONT No. 2		2C 651	D17
MWS SUP 2		W 251	D15
ADC 2 28V SUP		2F 74	F12
TRIM COMP 1 SUP	13-215	1C 162	C 5
TRIM SYNCHRO SYS 1 SUP		1C 163	E 5
AP/FD SYS 2 SUP	13-216	2C 20	A17
INS COMPTR SUP 3		F 2	B15
LAT ACCELMTR 2 26V SUP		2C 42	B16
SAFETY FLT CONT COMP No. 2 26V SUP		2C 653	C16
SAFETY FLT CONT COMP No. 2 115V SUP		2C 652	C17
COMPASS COUPLER 2 NORM SUP		2F 130	D15
AUTO STAB 2 COMP SUP		2C 37	D17
AFCS MODE SYS 2 LTS SUP		2C 273	E17
ADC 2 115V SUP		2F 73	F15

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
LDG DISPLAY SYS 2 SUP		2C 191	F16
AP/FD COMP 2 SUP		2C 18	F18
ATT INS 2ND PLT SW SUP	15-216	2F 13	D21

(2) On panel 13-216, set circuit breaker X345, map ref. G4.

(3) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(4) At Flight Engineer's station, on EQUIPMENT BAY COOLING panel, make certain that electronics rack ventilation is in operation (Ref. 21-21-00, Servicing).

(5) Set flight control system in Blue or Green electrical mode (Ref. 27-00-00, Servicing).

(6) On First Officer's instrument panel, make certain that ATT INS 2/INS 3 switch is in INS 2 position.

(7) Energize INS 2 (Ref. 34-45-00, Adjustment/Test).

NOTE : AP/FD 2 will engage only when G flag has disappeared from associated ADI.

(8) At Flight Engineer's station, on COMPASS control unit, SYS 2 side, make certain that DG-MAG switch is in MAG position.

(9) On centre console :

(a) On ADC control panel, ADC 2 side :

(a1) Make certain that TEST selector switch is in NORM position.

(a2) Place ON-OFF switch in ON position.

NOTE : If ADC 2 caption light illuminates, reset by pressing it so that it extinguishes.

(b) On AFCS datum adjust unit, make certain that TURN knob is in centre position and that NOSE UP-

NOSE DOWN control is in neutral position.

(10) On ceiling panel :

(a) On ANTISTALL SYSTEM control unit, place switch, side 2, in ON position.

(a1) SYST 1 FAIL caption light must illuminate.

(b) On AUTO STAB No. 2 control unit, engage the three PITCH, ROLL and YAW switches.

(b1) The three switches must remain engaged.

(b2) SYS 2 FAIL caption light must extinguish.

(c) On ELECTRIC TRIM control unit, engage switch 1.

(c1) This switch must remain engaged.

C. Tests

(1) On AFCS control unit, engage AP 2 switch.

(a) The switch must remain engaged.

(b) AP2 green indicator light must illuminate.

(c) PITCH HOLD and HDG HOLD push-buttons must illuminate.

(2) Manually disengage AP 2 switch and press either AP warning light on either W & LD indicator.

D. Close-Up

(1) On ceiling panel :

(a) On AUTO STAB No. 2 control unit, disengage PITCH, ROLL and YAW switches.

(b) On ELECTRIC TRIM control unit, disengage switch 1.

(c) On ANTISTALL SYSTEM control unit place switch, side 2, in OFF position.

(2) On centre console, on ADC control panel, place ON-OFF switch, ADC 2 side, in OFF position.

(3) De-energize INS 2 (Ref. 34-45-00, Adjustment/Test).

(4) On master warning panel, press LIGHTS TEST CANCEL switch then release it to cancel warnings.

(5) Carry out close-up required for flight control system (Ref. 27-00-00, Servicing).

(6) Disconnect electrical ground power unit and de-energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(7) On panel 13-216, trip, safety and tag circuit breaker X-345, map ref. G4.

5. FD 2 Engagement

A. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	

B. Prepare

(1) Carry out the work preparation required for AP 2 but without setting the flight controls.

(2) On panel 5-213, make certain that circuit breaker 2C27, map reference A13 is set.

(3) On First Officer's instrument panel, make certain that FD 1/FD 2 switch is in FD 1 position.

(4) On First Officer's attitude director indicator (ADI) check that red FD flag is not visible and that FD 2 annunciator is visible.

C. Tests

(1) On AFCS control unit, engage FD 2 switch.

(a) This switch must remain engaged.

(b) PITCH HOLD push-button must illuminate.

(c) On First Officer's ADI, the pitch bar must appear.

(2) Disengage FD 2 switch.

(a) PITCH HOLD push-button must extinguish.

(b) On First Officer's ADI, the pitch bar must disappear.

D. Close-Up

(1) Carry out the close-up required for AP No. 2.

6. Engagement of both AP's

A. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	

B. Prepare

(1) Carry out work preparation required for AP 1 and AP 2.

C. Tests

(1) On AFCS control unit, engage AP 1 switch

(a) The switch must remain engaged.

(b) AP 1 green indicator light must illuminate.

(c) PITCH HOLD and HDG HOLD push-buttons must illuminate.

(2) On panel 5-211, on two VOR-ILS DME control units, select an ILS frequency.

(3) On AFCS control unit, select LAND mode.

(a) Prime indicator lights below LAND, VOR LOC and GLIDE push-buttons must illuminate.

(4) Engage AP 2 switch

(a) The switch must remain engaged.

(b) AP 1 switch must remain engaged.

(c) AP 2 green indicator light must illuminate.

(5) Disengage AP 2 switch

(a) AP 2 green indicator light must extinguish.

(6) Disengage AP 1 switch

(a) AP 1 green indicator light must extinguish.

(b) PITCH HOLD and HDG HOLD push-buttons must extinguish.

(c) On each W & LD indicator, AP red warning light must illuminate.

(d) Cavalry charge aural warning must sound.

D. Close-Up

(1) Carry out close-up required for AP 1 and AP 2.

(2) On ceiling panel, on flight control unit, place both ANTI STALL SYSTEM switches in OFF position.

7. Engagement of both FD's

A. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	

B. Prepare

(1) Carry out the work preparation required for FD 1 and FD 2.

(2) On both attitude director indicator (ADIs) check that red FD flag is not visible. Check that FD1 annunciator is visible on Captain's AD1 and that FD2 annunciator is visible on First Officer's ADI.

C. Tests

(1) On AFCS control unit, engage FD 1 and FD 2 switches.

(a) Both switches must remain engaged.

(b) PITCH HOLD push-button must illuminate.

(c) On Captain's and First Officer's ADI's, the pitch bars must appear.

(2) Disengage FD 1 and FD 2 switches.

(a) PITCH HOLD push-button must extinguish.

(b) The pitch bars must disappear.

D. Close-Up

(1) Carry out close-up required for FD 1 and FD 2.

(2) On ceiling panel, on flight control unit, place both ANTI STALL SYSTEM switches in OFF position.

AUTOPILOT - ADJUSTMENT/TEST

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

R B DO NOT ENGAGE AN AUTOPILOT WHEN THE AIRCRAFT IS ON JACKS.

1. General

WARNING : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

The two following tests cover pitch and azimuth channels tests.

2. Operational Test

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.47 metres (14 ft. 8 in.)	

B. Prepare

(1) Check that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
COMPASS COUPLER SYS 1 SW SUP	1-213	1F 134	F14
RAD/INS 1ST PLT SW SUP		1F 26	G17
NOSE UC WEIGHT SW "A" SYS SUP		G 291	M16
LH UC WEIGHT SW "A" SYS SUP		G 292	M17
RH UC WEIGHT SW & DOWNLOCK "A" SYS SUP		G 295	M18
AFCS TEST 1 28 V SUP		1C 383	R12
ADC1 28V SUP	2-213	1F 78	A 2
1ST PLT ADC INST SUP		1F 75	B 3
LH UC WEIGHT SW & DOWNLOCK "B" SYS SUP	3-213	G 293	B 8
RH UC WEIGHT SW "B" SYS SUP		G 294	B 9
NOSE U/C W/SW "B" SUP		G 296	D 8
AFCS TEST 2 28 V SUP	5-213	2C 383	F11
AFCS TEST 1 115 V SUP	13-215	1C 384	D 6
PLT'S LT TEST SUP	15-215	L1001	E14
2ND PLT ADC INST SUP	13-216	2F 75	A14
ADC 2 26 V SUP		2F 78	F14
AFCS TEST 2 115V SUP		2C 384	F17
COMPASS COUPLER SYS 2 SW SUP	15-216	2F 134	A21
RAD/INS 2ND PLT SW SUP		2F 26	E21

(2) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(3) At Flight Engineer's station, on EQUIPMENT BAY COOLING panel, make certain that electronics rack ventilation operates (Ref. 21-21-00).

(4) Set Flight Controls in blue or green electrical mode (Ref. 27-00-00, Servicing).

(5) Carry out the work preparation required for the engagement of both AP's and both FD's (Ref. 22-10-00, Servicing).

(6) On instrument panels ; place :

(a) Both RAD/INS switches in RAD position.

(b) Captain's COMP1/COMP2 switch in COMP1 position.

(c) First Officer's COMP1/COMP2 switch in COMP2 position.

R R (7) The aircraft must be on the ground, shock absorbers compressed.

R B R B WARNING : DO NOT ENGAGE AN AUTOPILOT WHEN THE AIRCRAFT IS ON JACKS

C. Test of AP/FD Pitch Computers by means of the ITEM System
R (Ref. Fig. 501)

NOTE : Test procedure being identical for each computer, only computer No.1 test is described while information concerning computer No.2 given in parentheses.

(1) At Flight Engineer's station, on ITEM control and indicator panel :

(a) Place side 1 (side 2) IFM-OFF-TEST selector switch in TEST position (this switch is of the pull-to-unlock type).

(b) Place FLIGHT-TEST ALL-TEST UNIT selector switch in TEST UNIT position.

(b1) ITEM indication must appear in window 3 (7) and TEST indication in window 4 (8).

(b2) ITEM system automatic test is then initiated and 3 minutes later approximately, readings must be :

- ITEM in window 3 (7)
- PASS in window 4 (8).

NOTE : If ITEM self test is ineffective, readings will be :

- ITEM in window 3 (7)
- FAIL in window 4 (8).

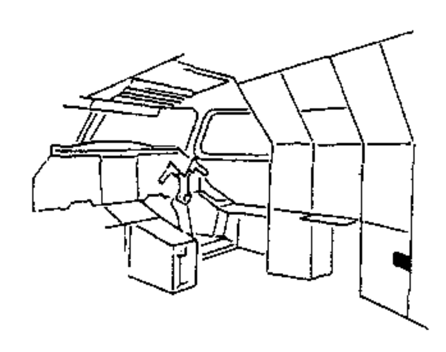
In such case, the test of AP/FD pitch computer No.1 (No.2) cannot be carried out.

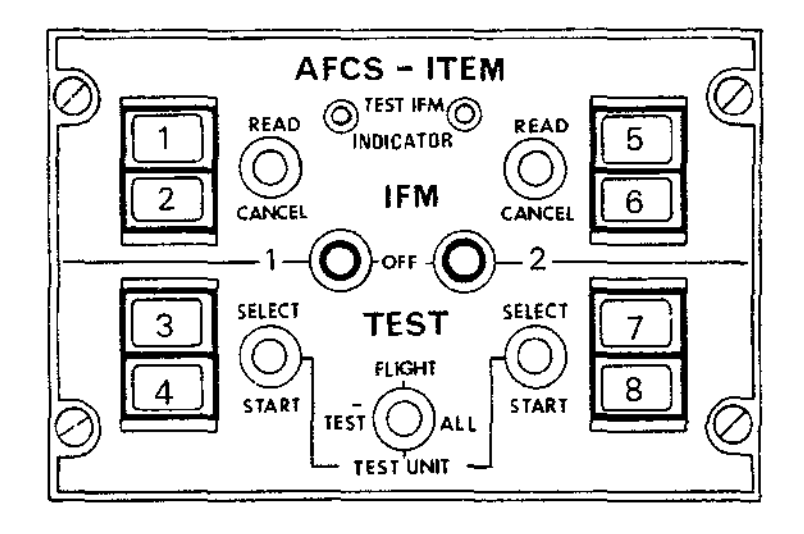
(c) Place and hold side 1 (side 2) SELECT-START switch in SELECT position then release it when AP.P indication appears in window 3 (7).

NOTE : AFCS indications appear in the following sequence : SFC, AP.P, AP.A, AT, AS.P, AS.R, AS.Y, ET, WLD in window 3 (7).

(d) Place side 1 (side 2) SELECT-START switch in START position then release it.

(d1) AP/FD pitch computer No.1 (No.2) test is initiated, the following indications must





CMA 22 10 00 5 AAM0

R ITEM Control and Indicator Panel
Figure 501

appear :

- AP.P in window 3 (7)
- TEST in window 4 (8).

(d2) And approximately 1 minute 30 seconds later :

- AP.P in window 3 (7)
- PASS in window 4 (8).

NOTE : If computer test is ineffective, indications will be :

- AP.P in window 3 (7)
- COMP or LAND in window 4 (8)

(e) Place side 1 (side 2) IFM-OFF-TEST selector switch in OFF position.

(e1) Check that indications disappear from windows 3 and 4 (7 and 8).

(f) Place FLIGHT-TEST ALL-TEST UNIT selector switch in FLIGHT position.

D. Test of AP/FD Azimuth Computers by means of the ITEM System
R (Ref. Fig. 501)

NOTE : Test procedure being identical for each computer, only computer No.1 test is described while information concerning computer No.2 is given in parentheses.

(1) On ceiling panel, on AUTOTHROTTLE unit, place the four isolation switches in ON position.

(2) On centre console, place the four throttle control levers in maximum thrust position.

(3) At Flight Engineer's station, on ITEM control and indicator panel.

(a) Place side 1 (side 2) IFM-OFF-TEST selector switch in TEST UNIT position. (This selector switch is of the pull-to-unlock type).

(b) Place FLIGHT-TEST ALL-TEST UNIT selector switch in TEST UNIT position.

(b1) ITEM indication must appear in indicator 3 (7) and TEST indication must appear in window 4 (8).

(b2) ITEM system automatic test is initiated and approximately 3 minutes later, readings must be :

- ITEM in window 3 (7).
- PASS in window 4 (8).

NOTE : If ITEM self test is ineffective readings will be :

- ITEM in window 3 (7)
- FAIL in window 4 (8).

- ITEM in window 3 (7)
- FAIL in window 4 (8)

In such case, AP/FD azimuth computer No.1 (No.2) test cannot be carried out.

(c) Place and hold side 1 (side 2) SELECT - START switch in SELECT position, then release it when AP.A indication appears in window 3 (7).

NOTE : AFCS indications appear in the following sequence : SFC, AP.P, AP.A, AT, AS.P, AS.R, AS.Y, ET, WLD in window 3 (7).

(d) Place side 1 (side 2) SELECT - START switch in START position then release it.

(d1) AP/FD azimuth computer No.1 (No.2) test is initiated, readings must be :

- AP.A in window 3 (7)
- TEST in window 4 (8).

(d2) Approximately 1 minute 30 seconds later, readings, must be :

- AP.A in window 3 (7)
- PASS in window 4 (8).

NOTE : If computer test is ineffective, readings will be :

- AP.A in window 3 (7)
- COMP or LAND in window 4 (8)

(e) Place side 1 (side 2) IFM-OFF-TEST selector switch in OFF position.

(e1) Check that indications disappear from window 3 and 4 (7 and 8).

(f) Place FLIGHT - TEST ALL - TEST UNIT selector switch in FLIGHT position.

(4) Place the four AUTOTHROTTLE isolation switches in OFF position and the four throttle control levers in mid-way position.

E. Test of AFCS Lights

(1) On LH side console, place and hold LIGHTS - LO - HI - TEST hold-to-test switch in TEST position.

(a) On AFCS control unit :

(a1) All mode selection push-buttons, and GO AROUND and MAX CRUISE indicator lights, must illuminate.

(a2) All prime indicator lights must illuminate.

(b) On Captain's W & LD indicator :

(b1) All lights must illuminate

(c) On First Officer's W & LD indicator :

(c1) AP and AT warning lights, aircraft symbol and beam deviation bars must illuminate.

(d) On glareshield, both AUTOLAND warning lights must illuminate.

(e) On Captain's main altimeter, altitude alert warning light must illuminate.

(2) On panel 16-211, act on AFCS MODES rotary switch.

(a) On AFCS control unit, illumination intensity must vary.

(3) Release LIGHTS - LO - HI - TEST hold-to-test switch.

(a) All above mentioned lights must extinguish.

(4) Engage and hold AP1 engage switch.

(a) On AFCS control unit, green AP1 indicator light (two lamps) must illuminate.

(5) Release AP1 engage switch.

(a) Green AP1 indicator light must extinguish.

(6) On RH side console, hold LIGHTS - LO - HI TEST hold-to-test switch in TEST position.
(a) On AFCS control unit :

(a1) All mode selection push-buttons, and GO

R AROUND and MAX CRUISE indicator lights, must
R illuminate.

(a2) All prime indicator lights must illuminate.

R

(b) On First Officer's W & LD indicator :

(b1) All lights must illuminate.

(c) On Captain's W & LD indicator :

(c1) AP and AT warning lights, aircraft symbol, beam deviation bars must illuminate.

(d) On glareshield, both AUTOLAND warning lights must illuminate.

R (e) On Captain's main altimeter, altitude alert war-
R ning light must illuminate.

R (7) On panel 6-211, act on AFCS MODES rotary switch.

(a) On AFCS control unit, illumination intensity must vary.

R (8) Release LIGHTS - LO - HI - TEST hold-to-test switch.

(a) All above mentioned lights must extinguish.

R (9) Engage and hold AP2 engage switch.

R (a) Green AP2 indicator light (two lamps) must illu-
R minate.

R (10) Release AP2 engage switch.

R (a) Green AP2 indicator light must extinguish.

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F. Check of AP Engagement, FD Engagement, and AP Warning

(1) On ADC control panel, place ADC1 in TEST 2 position, ADC2 in TEST 2 position and, when data have stabilized, press ADC1 and ADC2 caption lights. Re-engage systems which have disengaged (Trim and Autostabilizer).

(2) On AFCS control unit, engage FD1 switch.

(a) The switch must remain engaged.

(b) PITCH HOLD mode selection push-button must illuminate.

(c) On Captain's ADI, the pitch control bar must
R appear and be centred.

(3) Engage FD2 switch.

(a) The switch remains engaged.

(b) On First Officer's ADI, the pitch control bar
R must appear and be centred.

(4) Engage AP1 switch.

R (a) Switch must remain engaged.

R (b) HDG HOLD mode selection push-button must illuminate (PITCH HOLD is already illuminated).

R (c) AP1 caption light must illuminate.

R (d) Pitch bars must disappear from both ADIs.

R (e) Check that there is no significant displacement of control column.

(5) Engage AP2 switch.

(a) The switch must remain engaged.

(b) AP2 caption light must illuminate.

(c) AP1 switch must disengage.

(d) AP1 caption light must extinguish.

(e) Check that there is no significant displacement of control column.

(6) On Captain's and First Officer's VOR-ILS-DME control units, display an ILS frequency (108.1 MHz for instance).

(7) On AFCS control unit, select LAND mode.

(a) The prime indicator lights under LAND, GLIDE, and VOR/LOC push-buttons must illuminate.

(8) Engage AP1 switch.

(a) The switch must remain engaged.

(b) AP1 caption light must illuminate.

(c) AP2 switch must remain engaged.

(9) On Captain's control column, press then release AP DISC switch.

(a) AP1 and AP2 switches must disengage.

(b) AP1 and AP2 caption lights must extinguish.

(c) HDG HOLD push-button must extinguish (PITCH HOLD push-button remains illuminated).

(d) Pitch bars must appear on both ADIs.

(e) On both W & LD indicators, AP red warning lights must illuminate.

(f) The cavalry charge aural warning must sound during 1 second.

R (10) Press AP DISC switch again.

(a) Both AP warning lights must extinguish.

(11) Manually disengage FD1 and FD2 switches.

(a) PITCH HOLD selection push-button must extinguish.

(b) Pitch bars must disappear from both ADIs.

R (12) On ADC control panel, place the two TEST selector
R switches in NORM. When data have stabilized, press ADC1
R and ADC2 warning lights which extinguish.
R Reengage systems which have disengaged (electrical Trim
R and Autostabilizer).

G. Check of Datum Adjust Unit Controls

(1) On AFCS control unit, engage AP1 switch.

(a) The switch must remain engaged.

(b) PITCH HOLD and HDG HOLD push-buttons must illuminate.

(c) AP1 caption light must illuminate.

(d) Check that there is no significant displacement of control column.

(2) On AFCS datum adjust unit, place then hold AUTOPILOT NOSE UP - NOSE DOWN switch in NOSE UP position.

(a) Trim handwheel must rotate in up direction.

(b) Both control columns must move rearwards.

(c) Elevons must deflect upwards (Check on ICOVOL indicator).

(3) Hold AUTOPILOT NOSE UP - NOSE DOWN switch in NOSE DOWN position to set elevons to zero.

(4) Rotate TURN knob to the right.

(a) Both control column handwheels must rotate to the right.

(b) Elevons must deflect for a right turn (Check on ICOVOL indicator).

(5) Rotate TURN knob to the left.

(a) Both control column handwheels must rotate to the left.

(6) Bring TURN knob back to neutral position.

(7) Engage AP2 switch.

R (a) Switch must remain engaged.

R (b) AP1 switch must disengage.

(8) Repeat datum adjust unit check procedure described from 2 through 6 with AP2 engaged.

R (a) The results must be identical to those obtained
R with AP1 engaged.

(9) On First Officer's control column, press then release AP DISC switch.

(a) AP2 switch must disengage.

(b) AP warning light must appear on both Warning and Landing Display indicators.

(c) Cavalry charge aural warning must sound during one second.

(10) Press AP DISC switch.

(a) Both AP red warning lights must extinguish.

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H. Check of Track and Heading Push-Pull Knobs

(1) On AFCS control unit, pull both HDG - TRK push-pull knobs and display heading read on both HSIs' (zero degree heading error).

(2) Engage FD1 switch.

(a) The switch must remain engaged.

(b) PITCH HOLD push-button must illuminate.

(c) On Captain's ADI, roll FD bar must be centred.

(3) Select HDG/TRK mode.

(a) HDG/TRK push-button must illuminate.

(b) On Captain's ADI, roll FD bar must be centred.

(4) Slightly rotate HDG TRK 1 push-pull knob clockwise (increasing heading).

(a) On Captain's ADI, roll FD bar must move to the right.

(b) On Captain's HSI, heading pointer must indicate the heading selected by means of HDG-TRK push-pull knob.

(5) Reset selected heading to the aircraft heading.

(6) Manually disengage FD1 switch and engage FD2 switch.

(7) Select HDG/TRK mode and repeat check procedure described with HDG - TRK 2 push-pull knob and read First Officer's HSI and ADI indications.

(a) The results must be identical.

(8) Disengage FD2 switch.

I. Check of Mode Selection

(1) On AFCS control unit, engage FD1 switch.

(a) The switch must remain engaged.

(b) PITCH HOLD push-button must illuminate.

(2) Successively select MACH HOLD, IAS HOLD, ALT HOLD,
R VERT SPEED, and MAX CLIMB modes.

(a) At each selection, check that associated push button illuminates while previously illuminated push-button extinguishes.

R (3) With MAX CLIMB push-button illuminated, press MAX
R CRUISE light.

R (a) MAX CRUISE light must remain extinguished.

R

R (4) Select VOR/LOC mode.

(a) VOR/LOC prime indicator light must illuminate.

R (5) Select HDG HOLD mode.

(a) VOR/LOC prime indicator light must extinguish.

(b) HDG HOLD push-button must not illuminate.

R (6) Select ALT ACQ mode.

(a) ALT ACQ prime indicator light must illuminate.

R (7) Select PITCH HOLD mode.

(a) ALT ACQ prime indicator light must extinguish.

R (b) MAX CLIMB push-button must extinguish.

(c) PITCH HOLD push-button must illuminate.

R (8) Select GLIDE mode.

(a) VOR/LOC and GLIDE prime indicator lights must illuminate.

R (9) Select PITCH HOLD mode.

(a) GLIDE and VOR/LOC prime indicator lights must extinguish.

(b) PITCH HOLD push-button must illuminate.

R (10) Select LAND mode.

(a) GLIDE, VOR/LOC, and LAND prime indicator lights must illuminate.

R (11) Select PITCH HOLD mode.

(a) GLIDE, VOR/LOC, and LAND prime indicator lights must extinguish.

(b) PITCH HOLD push-button must illuminate.

R (12) Select TURB mode.

(a) FD1 switch must disengage.

(b) PITCH HOLD push-button must extinguish.

(c) TURB push-button must not illuminate.

J. Close-Up

(1) Carry out close up required for engagement of both APs and both FDs (Ref. 22-10-00, Servicing).

(2) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

3. Functional Test

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.47 m (14 ft. 8 in.) VOR and ILS Ground Test Unit : R TIC or Similar (Qty : 1)	
R Simulator - Pressure Sensors, R Crouzet (Qty : 2)	8720 9455
Radio Altimeter Ground Test Unit : R TRT AHV5018 or Similar (Qty : 1)	
Ground Telephones Safety Clips	

NOTE : The TIC VOR and ILS ground test unit is referred to as an example ; any equivalent test unit enabling simulation of LOC and GLIDE deviations can be used. This ground test unit is used in VOR, GLIDE, and LAND modes.

The radio altimeter ground test unit is used in LAND, LOC and GLIDE modes.

B. Prepare

NOTE : Each test can be carried out indepently. However, work preparation is common to all tests.

(1) Make certain that the following circuit breakers are set :

	SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
	COMPASS COUPLER SYS 1 SW SUP	1-213	1F 134	F14
	DEV 1 & 2 1ST PLT SW SUP		1R 38	G14
	RAD/INS 1ST PLT INS 1 SUP & IND		1F 26	G17
	AT1 CONT		1C 180	Q12
	AFCS 1 CONT		1C 19	Q14
	NOSE UC WEIGHT SW "A" SYS SUP		G 291	M16
	LH UC WEIGHT SW "A" SYS SUP		G 292	M17
R	RH UC WEIGHT SW & DOWNLOCK "A" SYS SUP		G 295	M18
	AFCS TEST 1 28V SUP		1C 383	R12
R	1ST PLT ADC INST SUP	2-213	1F 75	B 3
	ADC 1 26V SUP		1F 78	A 2
	1ST PLT VSI SUP		1F 97	A 3
R	RAD ALT 1 SUP		1S 56	D 8
	RMI VHF NAV 1 IND		1R 34	C 6
	ILS VHF NAV 1 SUP		1R 25	G 6
	VOR VHF NAV 1 SUP		1R 33	G 7
R	LH UC WEIGHT SW & DOWNLOCK "B" SYS SUP	3-213	G 293	B 8
	RH UC WEIGHT SW "B" SYS SUP		G 294	B 9
R	NOSE U/C W/SW "B" SUP		G 296	D 8
	AP/FD COMP 2 SUP	5-213	2C 19	A12
	AT2 CONT		2C 180	A14
R	TRIM 2 CONT		2C 161	B13
	AFCS TEST 2 28V SUP		2C 383	F11
	AFCS MODE SYS 1 LTS SUP	13-215	1C 273	B 5
	COMPASS COUPLER 2 STBY SUP		2F 131	B 7
	AT SYS 1 SUP		1C 179	C 6
	AT SYNCHRO SYS 1 SUP		1C 181	D 5
	AFCS TEST 1 115V SUP		1C 384	D 6
	2ND PLT ADC INST SUP	13-216	2F 75	A14
R	TRIM SYNCHRO SYS 2 SUP		2C 163	A16
	ADF 2 IND		2R 174	A18

	SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
	RMI VHF NAV 2 IND		2R 34	A19
	2ND PLT VSI SUP		2F 97	B13
	AT SYNCHRO SYS 2 SUP		2C 181	B17
	AT SYS 2 SUP		2C 179	D16
	VOR VHF NAV 2 SUP		2R 33	E14
	ILS VHF NAV 2 SUP		2R 25	E15
R	TRIM COMP 2 SUP		2C 162	E16
	AFCS MODE SYS 2 LTS SUP		2C 273	E17
R	ADC 2 26V SUP		2F 78	F14
	RAD ALT 2 SUP		2S 56	F19
	RAD ALT 1 & 2 IND	15-215	S 57	C 5
	PLT'S LT TEST SUP		L1001	E14
	COMPASS COUPLER SYS 2 SW SUP	15-216	2F 134	A21
	DEV 1 & 2 2ND PLT SW SUP		2R 38	F21
	INPH SUP	25-216	R 102	D 2

(2) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
STICK SHAKER SUP	1-213	W 513	P15
ALTD ALERT SYS COMP1 SUP	15-215	W 533	C 1
ALTD ALERT SYS COMP2 SUP	15-216	W 534	B27

R (3) Close circuit breakers X355 and X345, located respec-
R tively on panels 2-213 and 13-216, map Ref. H2 and
R G4.

R (4) Connect electrical ground power unit, and energize the aircraft electrical network. (Ref. 24-41-00, Servicing)

R (5) At Flight Engineer's station, on EQUIPMENT BAY COOLING panel, make certain that electronics rack ventilation

operates. (Ref. 21-21-00).

R (6) Set Flight Controls in blue or green electrical mode (Ref. 27-00-00, Servicing).

R (7) On ADC control panel, check that the two ADC switches are in OFF position, and that the two test selector switches are in NORM position.

R (8) Connect one simulator 87209455 to each ADC.

R NOTE : Two simulators are required for the LAND mode test. For the other modes, if only one simulator is available, isolate the channel not being tested by placing corresponding ADC in OFF.

R (a) On each simulator, check that SENSOR SIMUL switch is in SENSOR position. Set ALTITUDE and AIR SPEED potentiometers to minimum stop position.

R (b) On front panel of each ADC, remove protective cover from connector in top LH corner, and connect simulator wiring.

R (c) On ADC control panel, place both ADC switches in ON position. Wait approximately 30 secs., then press ADC1 and ADC2 caption lights, which must go off.

R (d) Check that no ADC flags appear on Captain's and First Officer's air data instruments.

R (9) Carry out the work preparation required for the engagement of both APs and both FDs (Ref. 22-10-00, Servicing).

R (10) At Flight Engineer's station, on MSU No.3, energize and align INS No.3 (Ref. 34-45-00, Adjustment/Test).

R (11) On Captain's instrument panel, place :

(a) RAD/INS switch in RAD position.

(b) FD1/FD2 switch in FD1 position.

(c) ATT INS1/INS3 switch in INS1 position.

(d) COMP1/COMP2 switch in COMP1 position.

(e) DEV1/DEV2 switch in DEV1 position.

(f) NAV INS1/INS2 switch in INS1 position.

(12) On First Officer's instrument panel, place :

(a) RAD/INS switch in RAD position.

(b) FD1/FD2 switch in FD2 position.

(c) ATT INS3/INS2 switch in INS2 position.

(d) COMP1/COMP2 switch in COMP2 position.

(e) DEV1/DEV2 switch in DEV2 position.

(f) NAV INS1/INS2 in INS2 position.

(13) On AFCS control unit :

(a) Pull both HDG - TRK push-pull knobs and select on indicators the heading indicated on both HSIs (zero degree heading error). Check that HDG indication appears on both HSI's.

(b) On VOR-LOC indicators, select the heading indicated on both HSIs.

(14) On ELECTRIC TRIM control unit, engage switch 2 (switch 1 is already engaged).

(15) The aircraft must be on the ground, shock absorbers compressed.

(16) To remove the effect of AP drifts during GLIDE capture, it is necessary to inhibit outer and inner loop integrators. This is done by making the following connections on AP/FD computer test connectors :

(a) Connect 1C12 terminals ZA83 and ZB83 to 1C13 terminal ZA54.
Interconnect 1C12 terminals ZA82, ZB82 and ZB89.
Interconnect 1C13 terminals ZA9 and ZA54.

(b) Connect 2C12 terminals ZA83 and ZB83 to 2C13 terminal ZA54.
Interconnect 2C12 terminals ZA82, ZB82 and ZB89.
Interconnect 2C13 terminals ZA9 and ZA65.

NOTE : Some tests are carried out with AP/FD No.1 engaged while information to carry out the tests with AP/FD No.2 engaged is given in parentheses.

Therefore, a full test requires carrying out test procedure with AP/FD No.1 and repeating it with AP/FD No.2.

C. Preliminary Tests

(1) Carry out AP/FD pitch and azimuth computers check by means of the ITEM system (Refer to Operational Test, paragraphs C and D).

(2) Carry out AFCS lights check (Refer to Operational Test, paragraph E).

D. Check of Requirements for AP and FD Engagement

NOTE : AP warnings shall be disregarded on disengagement of AP No.1 (or AP No.2). They are cancelled on AP reengagement.

(1) Requirements common to AP/FD No.1 (No.2) engagement.

(a) On AFCS control unit, engage switches AP1 and FD1 (AP2 and FD2).

- Both switches must remain engaged.
- PITCH HOLD and HDG HOLD push-buttons must illuminate.
- AP1 (AP2) caption light must illuminate.
- Make certain that there is no significant displacement of control column and handwheel.

(b) Check that both switches disengage if pressed.

(c) Engage switches AP1 and FD1 (AP2 and FD2).

(d) On panel 13-215 (13-216), trip circuit breaker 1C18 (2C18), map. ref. A5 (F18).

- AP1 and FD1 (AP2 and FD2) switches must disengage.

(e) Reset circuit breaker 1C18 (2C18) and engage AP1 and FD1 (AP2 and FD2) switches.

(f) On panel 1-213 (5-213), trip circuit breaker 1C17 (2C17), map. ref. Q13 (A11).

- AP1 and FD1 (AP2 and FD2) switches must disengage.

(g) Reset circuit breaker 1C17 (2C17) and engage AP1 and FD1 (AP2 and FD2) switches.

(h) On panel 2-213 (13-216), trip circuit breaker 1C20 (2C20), map Ref. C5 (A17).
- AP1 and FD1 (AP2 and FD2) switches must disengage.

(i) Reset circuit breaker 1C10 (2C20) and engage AP1 and FD1 (AP2 and FD2) switches.

(j) On ceiling panel, on AUTOSTAB No.1 (AUTOSTAB No.2) control unit, manually disengage PITCH lever

- AP1 and FD1 (AP2 and FD2) switches must disengage.

(k) Reengage PITCH lever, then, AP1 and FD1 (AP2 and FD2) switches.

(l) Check that the results are identical with ROLL, then, YAW levers of AUTOSTAB No.1 (AUTOSTAB No.2) control unit.

(m) On Flight Control Unit, place ANTI STALL SYSTEM 2 (ANTI STALL 1) switch in OFF position.

- PITCH switch on AUTOSTAB No.2 (No.1) unit must disengage.

- Place SFC2 (SFC1) switch in OFF position. AUTOSTAB No.2 (No.1) PITCH lever disengages.
- Place SFC1 (SFC2) in OFF position.

(n) Place ANTI STALL SYSTEM 1 (ANTI STALL SYSTEM 2) switch in OFF position.

(o) On centre console, on ADC control panel, place ADC1 (ADC2) switch in OFF position.

- AP1 and FD1 (AP2 and FD2) switches must disengage.
- On ELECTRIC TRIM control unit, switch 1 (2) must disengage.
- The three PITCH, ROLL and YAW switches on AUTOSTAB No.1 (No.2) unit must remain engaged.

(p) Place both ANTI STALL SYSTEM switches in ON position, and engage PITCH switch on AUTOSTAB No.2 (No.1) unit.

(q) Place ADC1 (ADC2) switch in ON position, place both TEST selector switches in TEST 1 position. When data have stabilized, press both caption lights ADC1 and ADC2, which must then extinguish.

(r) Engage Autostabilizer and Trim systems and check that AP1 and FD1 (AP2 and FD2) switches cannot be engaged.

(s) Place both TEST selector switches in NORM position. When data have stabilized, press both ADC1 and ADC2 caption lights. Engage Autostabilizer and Trim systems, and AP1 and FD1 (AP2 and FD20 switches.

(t) At Flight Engineer's station, on Compass Coupler control panel, act on SYS1 (SYS2) DEC-INC switch to have a heading drift on Compass Coupler No.1 (No.2).

- HDG warning flag must appear on Captain's (First Officer's) HSI.
- AP1 and FD1 (AP2 and FD2) switches must disengage.

(u) Release DEC-INC switch and when HDG flag is cancelled, reengage AP1 and FD1 (AP2 and FD2) switches.

(v) At Flight Engineer's station, on INS No.1 (INS No.2) MSU, place selector switch in OFF position.

- G flag must appear on Captain's (First Officer's) ADI. INS warning light illuminates on master warning panel.
- AP1 and FD1 (AP2 and FD2) switches must disengage.

(w) Energize INS No.1 (INS No.2) and when G flag disappears, engage AP1 and FD1 (AP2 and FD2) switches.

(2) Requirements specific to AP1(2) engagement.

(a) On ceiling panel, on ELECTRIC TRIM control unit, place either switch in OFF position.

- AP1 and FD1 (AP2 and FD2) switches must remain engaged.

(b) Place the other ELECTRIC TRIM switch in OFF position.

- AP1 (AP2) switch must disengage, FD1 (FD2) switch must remain engaged.

(c) Place both ELECTRIC TRIM switches in ON position, and engage AP1 (AP2) switch.

(d) On ceiling panel, on RELAY JACK control unit, place GREEN ONLY - NORM - BLUE ONLY selector switch in GREEN ONLY (BLUE ONLY) position.

- AP1 (AP2) switch must disengage.

(e) Place selector switch in NORM position without

engaging AP1 (AP2).

(f) On centre console, on AFCS control unit, slightly rotate TURN knob and check that AP1 (AP2) cannot be engaged.

(g) Bring TURN knob back to neutral position, act on AUTOPILOT NOSE UP - NOSE DOWN toggle switch, in NOSE UP direction, for instance, and check that AP1 (AP2) cannot be engaged.

(h) Release AUTOPILOT NOSE UP - NOSE DOWN switch and disengage FD1 (FD2) switch.

E. Check of AP Instinctive Disconnect Switches

(1) Captain's AP DISC switch.

(a) On AFCS control unit, engage AP1 switch.

- The switch must remain engaged.
- AP1 caption light must illuminate.
- PITCH HOLD and HDG HOLD push-buttons must illuminate.

(b) On Captain's control column handwheel, push then release AP DISC switch.

- AP1 switch must disengage.
- The cavalry charge aural warning must sound during one second only.
- On both Warning and Landing Display indicators, AP red warning lights must illuminate.

(c) Push AP DISC switch.

- AP warning lights must extinguish.

(d) Engage AP2 switch and repeat check of Captain's AP DISC switch.

- Check that on first action on AP DISC switch, AP2 disengages and that on second action on switch, warnings are cancelled.

(2) First Officer's AP DISC switch.

(a) Engage AP1 switch

- The switch must remain engaged.

(b) On First Officer's control column handwheel, press then release AP DISC switch.

- AP1 switch must disengage.
- The cavalry charge aural warning must sound during one second only.
- On both Warning and Landing Display indicators, AP red warning lights must illuminate.

(c) Press AP DISC switch.

- AP warning lights must extinguish.

(d) Engage AP2 switch and repeat check with First

Officer's AP DISC switch.

- Check that, on first action on AP DISC switch, AP2 disengages and that on second action on switch, warnings are cancelled.

F. Check of AP Force Limiters

(1) Pitch axis force limiter.

(a) On AFCS control unit, engage AP1 switch.

- The switch must remain engaged.
- Wait until flight controls have stabilized.

(b) Pull Captain's (First Officer's) control column for full contact on force limiter.

- AP1 switch must disengage.
- AP warnings must be triggered.

(c) Reengage AP1 switch.

(d) Push control column.

- AP1 switch must disengage.
- AP warnings must be triggered.

(e) Engage AP2 switch and repeat check procedure.

- Check that force limiter causes AP2 to disengage.

(f) Cancel warnings.

(2) Roll axis force limiter.

(a) Engage AP1 switch and wait until flight controls have stabilized.

(b) Rotate Captain's (or First Officer's) control column handwheel to the left for full contact on force limiter.

- AP1 switch must disengage.

(c) Re-engage AP1 switch.

(d) Rotate handwheel to the right.

- AP1 switch must disengage.

(e) Engage AP2 switch and repeat check procedure.

- Check that force limiter causes AP2 to disengage.

(f) Cancel warnings.

(3) Yaw axis force limiter.

(a) Engage AP1 switch and wait until flight controls have stabilized.

(b) Act on Captain's (or First Officer's) pedals for a left turn for full contact on force limiter.

- AP1 switch must disengage.

(c) Re-engage AP1 switch.

(d) Act on pedals for a right turn.

- AP1 must disengage.

(e) Engage AP2 switch and repeat check procedure.

- Check that force limiter causes AP2 to disengage.

(f) Cancel warnings.

G. Check of AFCS Datum Adjust Unit Controls and of Autotrim Function

(1) AUTOPILOT NOSE UP NOSE DOWN toggle switch.

(a) On AFCS control unit, engage AP1 switch.

- The switch must remain engaged.
- PITCH HOLD and HDG HOLD push-buttons must illuminate.
- Check that then is no significant displacement of control column.

(b) On AFCS datum adjust unit, place AUTOPILOT NOSE UP - NOSE DOWN toggle switch in first position (slow rate) of NOSE UP direction.

- Trim handwheel must rotate in up direction.
- Control column must move rearwards.
- Elevons must deflect upwards (Check on ICOVOL indicator).

(c) Place toggle switch in first position (slow rate) of NOSE DOWN direction.

- Trim handwheel must rotate in down direction.
- Control column must move forwards.
- Elevons must deflect downwards.

(d) Place toggle switch in second position (fast rate) of NOSE UP direction.

- Trim handwheel must rotate in up direction (faster than during the two previous operations)

NOTE : During this operation, AP force limiters may cause AP disengagement.

(e) If AP does not disengage, push either AP DISC switch to cause disengagement and check that their is no jerk on control column.

(f) Engage AP1 switch and disengage ELECTRIC TRIM switch No.1.
Place NOSE UP - NOSE DOWN toggle switch in second position (fast rate). of NOSE DOWN direction to reset elevons to zero position.

- Trim handwheel rotates in down direction to reach zero position.

(g) Disengage AP and check that there is no jerk on control column.

(h) Re-engage ELECTRIC TRIM switch No.1.

(2) TURN knob.

(a) On AFCS control unit, engage AP1 switch.

(b) On AFCS datum adjust unit, rotate TURN knob to the right.

- Control column handwheel must rotate to the right.
- Elevons must deflect for a right turn (Check on ICOVOL indicator).

(c) Rotate TURN knob to the left.

- Control column handwheel must rotate to the left.
- Elevons must deflect for a left turn.

(d) Place TURN knob in neutral position.

(e) Disengage AP and cancel warnings.

(3) Engage AP2 switch and repeat tests of AUTOPILOT NOSE UP-NOSE DOWN toggle switch and of TURN knob, with AP2. Check that results obtained are identical to those obtained with the AP1.

H. Check of FD1/FD2 Change Over

(1) On Captain's and on First Officer's instrument panels, check that FD1/FD2 switches are placed in the associated FD position (FD1 position on Captain's instrument panel and FD2 position on First Officer's instrument panel).

(2) On both ADIs, FD flags must not appear ; FD1 appears on Captain's ADI annunciator and FD2 on First Officer's ADI annunciator.

(3) On AFCS control unit, enage FD1 switch.

(a) The switch must remain engaged.

(b) PITCH HOLD push-button must illuminate.

(c) On Captain's ADI :

- The pitch bar must be centred.

(4) Place First Officer's FD1/FD2 switch in FD1 position.

(a) On First Officer's ADI

- FD1 appears on annunciator.
- The pitch bar must be centred.

(5) Select HDG/TRK mode.

(a) On both ADI's, the roll bar must be centred.

(6) Place Captain's FD1/FD2 switch in FD2 position.

(a) On Captain's ADI.

- FD2 appears on annunciator.
- The pitch and the roll bars must disappear.

(7) Engage FD2 switch.

(a) The switch must remain engaged.

(b) On Captain's ADI :

- The pitch and the roll bars must be centred.

(8) Disengage FD1 switch.

(a) On First Officer's ADI.

- The pitch and the roll bars must disappear.

(9) Place First Officer's FD1/FD2 switch in FD2 position.

(a) On First Officer's ADI :

- FD2 appears on annunciator.
- The pitch and the roll bars must be centred.

(10) Place Captain's FD1/FD2 switch in FD1 position.

(a) On Captain's ADI :

- FD1 appears on annunciator.
- The pitch and the roll bars must disappear.

(11) Disengage FD2 switch.

(a) PITCH HOLD and HDG/TRK mode push-buttons must extinguish.

(b) On First Officer's ADI :

- The pitch and the roll bars must disappear.

I. Check of HDG HOLD Mode

(1) With AP No.1 engaged.

(a) At Flight Engineer's station, on COMPASS COUPLER control panel, act on SYS1 DEC/INS switch to obtain a heading deviation of approximately 5 degrees to the right.

- HDG flag must appear on Captain's HSI.

(b) Release DEC/INC switch and, when HDG flags disappear, engage AP1 switch.

- HDG HOLD and PITCH HOLD mode selection push buttons must illuminate.
- Control column handwheel must rotate to the right and stop when lubber line indicates the initial heading.

(c) On AFCS control unit, act on TURN knob to bring control column handwheel back to neutral position.

(d) Disengage AP No.1, cancel warnings and act on SYS1 DEC/INC switch to obtain a heading deviation of approximately 5 degrees to the left.

- Engage AP1 switch : control column handwheel must rotate to the left and stop when lubber line indicates the initial heading.

(e) Act on TURN knob to reset control column handwheel back to neutral position.

(f) Disengage AP, and cancel warnings.

(2) With AP No.2 engaged.

(a) Repeat above check, using SYS2 DEC/INC switch, with AP2 engaged.

- The results must be identical.

J. Check of HDG/TRK Mode

(1) HDG mode, with FD No.1 engaged.

(a) On Captain's HSI, check that HDG indicator is visible and that selected track or heading pointer indicates the heading of the aircraft.

(b) Engage FD1 switch, and select HDG/TRK mode.

- The HDG/TRK mode selection push-button must illuminate.
- On Captain's ADI, the roll bar must be centred.

(c) On AFCS control unit, slightly rotate HDG-TRK1 push-pull knob clockwise (increasing heading).

- On Captain's ADI, the roll bar must move to the right.
- On Captain's HSI, track or heading pointer must indicate the heading selected by means of the HDG-TRK1 push-pull knob.

(d) Select a heading identical to the aircraft heading.

- The roll bar must be centred.
- The track or heading pointer must show the heading of the aircraft.

(e) Rotate TRK-HDG1 push-pull knob counterclockwise and check that the roll bar moves to the left.

(f) Select a heading identical to the heading of the aircraft.

- The roll bar must be centred
- The track or heading pointer must show the heading of the aircraft.

(g) On Captain's HSI, press TEST push-button.

- FD1 switch must disengage.
- HDG flag must appear on Captain's HSI.

(h) Release TEST push-button ; wait until HDG flag disappears ; engage AP1 switch and select HDG/TRK mode.

- HDG/TRK mode selection push-button must illuminate.

(i) On AFCS datum adjust unit, act on TURN control knob.

- HDG/TRK mode selection push-button must extinguish.
- HDG HOLD mode selection push-button must illuminate.

(j) Disengage AP1 switch, and cancel warnings.

(2) HDG mode, with FD No.2 engaged.

(a) Repeat above check with First Officer's HSI, FD2 switch, First Officer's ADI, HDG/TRK2 push-pull knob and AP2 engaged.

- Check that the results are identical.

(3) TRK mode with FD No.1 engaged.

(a) On AFCS control unit, push HDG-TRK1 push-pull knob in TRK position.

(b) On Captain's HSI, check that TRK indicator replaces HDG indicator. Track or heading pointer shows the heading of the aircraft.

R **ON A/C 006-007,

(c) On centre console, on CDU No.1, place selector in TEST position.

- On Captain's HSI, drift pointer must show a drift of approximately 11 degrees to the right.

(d) Engage FD1 switch and select HDG/TRK mode.

- HDG/TRK mode selection push-button must illuminate.
- On Captain's ADI, the roll bar must not be centred.

(e) On centre console, place CDU No.1 selector in DSR TK/STS position.

(c) Generate a drift signal :

(c1) Place MSU No.1 selector in STBY position, then display existing position on CDU No.1 :

- Latitude : 50°00 ON

- Longitude : 000°00 0E

(c2) Place MSU No.1 selector in OFF position, then, in ALIGN position.

(c3) On CDU No.1, place AUTO MAN selector in MAN position :

- INSERT key must remain illuminated.

(c4) Insert the following way points :

No.1 - Latitude : 40°00 0N
Longitude : 006°25 7W

No.2 - Latitude : 60°00 0N
Longitude : 009°48 0E

(c5) Wait until system reaches status 75 FROM-TO indicator displays 1 - 2.

(c6) Press WYPT CHG key which must illuminate.

(c7) Press 0 key twice.

- FROM-TO indicator displays 0-0.
- Captain's HSI must show a drift of 11 degrees to the right.

(d) Engage FD1 switch and select TRK/HDG mode.

- TRK/HDG mode selection push-button must illuminate.
- On Captain's ADI, the roll bar must not be centred.

(e) Place MSU No.1 selector in STBY position.

(f) Disengage FD1 switch, and pull HDG-TRK2 push-pull knob.

(4) TRK mode, with FD No.2 engaged.

(a) Repeat above check by means of INS No.2, First Officer's controls and instruments, with FD No.2 engaged.

= The results must be identical.

K. Check of INS Mode

(1) With FD No.1 engaged.

(a) Place Captain's RAD/INS switch in INS position.
(b) Engage FD1 switch.

- PITCH HOLD mode selection push-button must illuminate.
- On Captain's ADI, the pitch bar must be centred.

R **ON A/C 006-007,

(c) On CDU No.1, place selector in TEST position, and AUTO-MAN-RMT selector in RMT position.

(c1) On Captain's HSI, the lateral deviation bar must move to the left.

(d) Select INS mode.

(d1) INS mode selection push-button must illuminate.

(d2) On Captain's ADI, the roll bar must move to the left.

(e) Operate CDU No.1 selector from TEST position to any other position, and place AUTO-MAN-RMT selector in MAN position.

(c) Generate a steering signal.

(c1) Place MSU No.1 selector in STBY position, then display existing position on CDU No.1 :

- Latitude : 50°00 0N
- Longitude : 000°00 0E

(c2) Place MSU No.1 in OFF position, then, in ALIGN position.

(c3) On CDU No.1, place AUTO-MAN selector in MAN position.

- INSERT key must remain illuminated.

(c4) Insert the following way points :

No.1 - Latitude : 40°00 0N
Longitude : 006°25 7W

No.2 - Latitude : 60°00 ON
Longitude : 000°00 OE

(c5) Wait until system reaches status 75 FROM-TO indicator displays 1 - 2.

(c6) Press WYPT CHG key, which must illuminate.

(c7) Press 0 key twice.

- FROM-TO indicator displays 0-0.
- On Captain's HSI, the lateral deviation bar must move to the right.

(d) Select INS mode.

(d1) INS mode selection push button must illuminate.

(d2) On Captain's ADI, the roll bar must move to the right.

(e) Place MSU No.1 selector in STBY position.

(f) Disengage FD1 and place Captain's RAD/INS switch in RAD position.

(2) With FD No.2 engaged.

(a) Place First Officer's RAD/INS switch in INS position.

(b) Repeat above check using INS No.2, First Officer's instrumentation, with FD No.2 engaged.

(b1) The results must be identical.

L. Check of VOR Mode

(1) With FD No.1 engaged.

(a) Make certain that Captain's RAD/INS switch is in RAD position.

(b) On Captain's VOR-ILS-DME control unit, display the VOR frequency indicated on VOR ground test unit.

(c) On AFCS control unit, operate VOR-LOC 1 knob to display a VOR radial 30 degrees to the right of the aircraft heading.

(d) By means of ground test unit, simulate a beam deviation to the right which will prevent capture phase.

(e) Engage FD1 switch and select HDG/TRK mode.

- HDG/TRK mode selection push-button must illuminate.
- On Captain's ADI, the roll bar must be centred.

(f) Select VOR/LOC mode.

- VOR/LOC prime indicator light must illuminate.
- TRK/HDG push-button must remain illuminated.

(g) Check that VOR test is inhibited.

(h) Gradually decrease VOR deviation. On capture :

- VOR/LOC prime indicator light and HDG/TRK mode selection push-button must extinguish.
- VOR/LOC mode selection push-button must illuminate.
- On Captain's ADI, the roll bar must move to the left.

(i) Cancel VOR deviation.

- The roll bar must be centred.

(j) Select HDG/TRK mode.

- HDG/TRK mode selection push-button must illuminate.
- VOR/LOC mode selection push-button must extinguish.

(k) Simulate a deviation to the left of VOR beam which will prevent capture phase. Place Captain's RAD/INS switch in INS position, and select VOR/LOC mode.

- VOR/LOC prime indicator light must illuminate.

(l) Cancel VOR deviation :

- VOR/LOC mode selection push-button must remain extinguished.

(m) Place Captain's RAD/INS switch in RAD position.

- VOR/LOC prime indicator light and HDG/TRK push button must extinguish.
- VOR/LOC push-button must illuminate.
- On Captain's ADI, the roll bar must be centred.

(n) Disengage FD1 switch and disconnect ground test unit.

(2) With FD No.2 engaged.

(a) Repeat check with First Officer's instruments and switches, and FD2 engaged.

- The results must be identical.

M. Check of TURB Mode

(1) Engage FD1 switch.

(a) The switch must remain engaged.

(b) PITCH HOLD push-button must illuminate.

(2) Engage AP1 switch.

(a) The switch must remain engaged.

(b) HDG HOLD push-button must illuminate.

(3) Select TURB mode.

(a) TURB mode selection push-button must illuminate.

(b) PITCH HOLD and HDG HOLD push-buttons must extinguish.

(c) FD1 must disengage.

(4) Select PITCH HOLD mode.

(a) PITCH HOLD and HDG HOLD mode push-buttons must illuminate.

(b) TURB push-button must extinguish.

(5) Disengage AP1 and cancel warnings.

(6) Repeat check with FD No.2 and AP No.2 engaged.

(a) Check that the results are identical.

N. Check of IAS HOLD Mode

(1) With FD1 engaged.

(a) Simulate an airspeed of 300 Knots on channel 1 (Captain's).

- Place ADC2 switch in OFF position.

- On pressure sensors simulator connected to ADC1, place sensor SIMUL switch in SIMUL position, and using AIR SPEED potentiometers, simulate an airspeed of 300 knots, read on the Captain's airspeed indicator.

(b) Engage FD1 switch, and select IAS HOLD mode.

- Switch must engage.

- IAS HOLD mode selection push-button must illuminate.

- On Captain's ADI, FD pitch bar must be centred.

(c) Simulate an increase in airspeed.

- On Captain's ADI, FD pitch bar must move upwards.

(d) Return airspeed to 300 kt. and simulate a decrease in airspeed.

- On Captain's ADI, FD pitch bar must move downwards.

(e) Disengage FD. On pressure sensors simulator connected to ADC1 set AIR SPEED potentiometers to minimum stop position and place SENSOR SIMUL switch in SENSOR position.

(f) Phase ADC2 switch in ON position.

(2) With FD2 engaged.

(a) Simulate an airspeed of 300 knots on channel 2 (First Officer's).

- Place ADC1 switch in OFF position.

- On pressure sensors simulator connected to ADC2, place SENSOR SIMUL switch in SIMUL posi-

tion and simulate an airspeed of 300 knots, read on the First Officer's airspeed indicator.

(b) Engage FD2 switch, and select IAS HOLD mode. Simulate an increase condition on decrease in airspeed

- Check on Captain's ADI that FD pitch bar moves upwards, then downwards.

(c) Disengage FD. Set AIR SPEED potentiometers to minimum stop position and place SENSOR SIMUL switch in SENSOR position.

(d) Place ADC1 switch in ON position.

O. Check of MACH HOLD Mode

(1) With FD1 engaged.

(a) Simulate a Mach number of 0.8 on Captain's channel.

- Place ADC2 switch in OFF position.

- On pressure sensors simulator connected to ADC1, place SENSOR SIMUL switch in SIMUL position, and using AIR SPEED potentiometers, simulate a Mach number of 0.8, read on Captain's machmeter.

(b) Engage FD1 switch, and select MACH HOLD MODE.

- Switch must remain engaged.

- MACH HOLD mode selection push-button must illuminate.

- On Captain's ADI, FD pitch bar must be centred.

(c) Simulate an increase in Mach number.

- On Captain's ADI, FD pitch bar must move upwards.

(d) Return Mach number to 0.8, then simulate a decrease in Mach number.

- On Captain's ADI, FD pitch bar must move downwards.

(e) Disengage FD. On pressure sensors simulator connected to ADC1, set AIR SPEED potentiometers to minimum stop position, and place SENSOR SIMUL switch in SENSOR position.

(f) Place ADC2 switch in ON position.

(2) With FD2 engaged.

(a) Simulate a Mach number of 0.8 on First Officer's channel.

- Place ADC1 switch in OFF position.

- On pressure sensors simulator connected to ADC2, place SENSOR SIMUL switch in SIMUL position, and

simulate a Mach number of 0.8, read on the First Officer's machmeter.

(b) Engage FD2 switch, and select MACH HOLD mode. Simulate an increase and then a decrease in Mach Number.

- Check on First Officer's ADI that FD pitch bar moves upwards, then downwards.

(c) Disengage FD. Set AIR SPEED potentiometers to minimum stop position, and place SENSOR SIMUL switch in SENSOR position.

(d) Place ADC1 switch in ON position.

P. Check of MAX CLIMB and MAX CRUISE Modes

(1) MAX CLIMB mode, with FD1 engaged.

(a) Simulate on Captain's channel an airspeed of 500 knots and an altitude of 48000 ft.

- Place ADC2 switch in OFF position.

- On pressure sensors simulator connected to ADC1, place SENSOR SIMUL switch in SIMUL position, and ALTITUDE potentiometers, simulate an airspeed of 500 knots and an altitude of 48000 ft., read on Captain's airspeed indicator and altimeter.

(b) On AFCS control unit, engage AT1 switch.

- Switch must remain engaged.

- IAS HOLD mode selection push-button (AUTO-THROTTLE section) must illuminate.

(c) Move the four throttle control levers to max. thrust position.

(d) Engage FD1 and FD2 switches, and select MAX CLIMB mode.

- Switches must remain engaged.

- MAX CLIMB mode selection push-button must illuminate.

- IAS HOLD mode selection push-button must extinguish (AUTOTHROTTLE section).

- On both ADIs, FD pitch bars must move downwards.

(e) Simulate a speed of 530 knots.

- On Captain's ADI, FD pitch bar must be centred.

(f) Select ALT HOLD mode.

- ALT HOLD mode selection push-button must illuminate, MAX CLIMB mode selection push-button must extinguish.

- IAS HOLD mode selection push-button (AUTO-THROTTLE section) must illuminate.

(g) Select MAX CLIMB mode.

- MAX CLIMB mode selection push-button must illuminate, ALT HOLD push-button must extinguish.

- IAS HOLD mode selection push-button (AUTO-THROTTLE section) must extinguish.

(h) Check that the throttle control levers are in max. thrust position.

(i) On AFCS datum adjust unit, act on NOSE UP-NOSE DOWN switch in NOSE DOWN direction for 5 to 10 secs.

- On Captain's ADI, FD pitch bar must move downwards.

(2) MAX CRUISE mode with FD1 engaged.

(a) Check that both FDs are engaged in MAX CLIMB mode.

(b) Check that Vc and VMO pointers coincide on Captain's airspeed indicator.

(c) On Captain's channel, simulate a Mach number of 2 and an altitude of 48500 ft., (Mach number to be read on Captain's machmeter, altitude to be read on Captain's altimeter).

(d) Check that throttle control levers are in max. thrust position.

(e) Slowly increase altitude, checking at approximately 50200 ft. that :

- MAX CRUISE light illuminates.

- MACH HOLD mode selection push-button (AUTO-THROTTLE section) illuminates and remains on for approximately 100 secs.

- On Captain's ADI, FD pitch bar is centred.

- On First Officer's ADI, FD pitch bar must move out of view.

(f) On Captain's channel, simulate a Mach number of 2.04 and an altitude of 52000 ft.

- MACH HOLD mode selection push-button (AUTO-THROTTLE section) must illuminate.

- Throttle control levers must move towards idle position.

- On Captain's ADI, FD pitch bar must move upwards.

(g) Simulate a Mach number of 2, and move throttle control levers to max. thrust position.

- MACH HOLD mode selection push-button must extinguish.

- FD pitch bar must be centred.

(h) Move each throttle control lever, one by one, towards idle position. When last lever moves away from max. thrust position, check that :

- MACH HOLD mode selection push-button (AUTO-THROTTLE section) illuminates.

- FD pitch bar moves slightly upwards.

(i) Move throttle control levers back to max. thrust position.

- FD pitch bar must be centred.

- MACH HOLD mode selection push-button must extinguish.

(j) Select ALT HOLD mode.

- ALT HOLD mode selection push-button must illuminate.

- MACH HOLD mode selection push-button (AUTO-THROTTLE section) must illuminate.

- MACH CLIMB mode selection push-button and MAX CRUISE light must extinguish.

(k) Select MAX CLIMB mode.

- MAX CLIMB mode selection push-button and MAX CRUISE light must illuminate.

- MACH HOLD mode selection push-button (AUTO-

THROTTLE section) must illuminate and remain on for approx. 100 secs.

(l) Disengage FD and autothrottle. Cancel AT warnings.

(m) On simulator, set AIR SPEED and ALTITUDE potentiometers to minimum stop position and place SENSOR SIMUL switch in SENSOR position.

(n) Place ADC2 switch in ON position.

(3) MAX CLIMB mode with FD2 engaged

(a) Simulate on First Officer's channel an airspeed of 500 knots and an altitude of 48000 ft.

- Place ADC1 switch in OFF position.

(b) On AFCS control unit, engage AT2 switch.

- Switch must remain engaged.
- IAS HOLD mode selection push-button (AUTOTHROTTLE section) must illuminate.

(c) Move the four throttle control levers to max. thrust position.

(d) Engage FD2 switch, and select MAX CLIMB mode.

- Switch must remain engaged.
- MAX CLIMB mode selection push-button must illuminate.
- IAS HOLD mode selection push-button must extinguish (AUTOTHROTTLE section).
- On First Officer's ADI, FD pitch bar must move downwards.
- On Captain's ADI, FD pitch bar must remain out of view.

(e) Simulate a speed of 530 knots.

- On First Officer's ADI, FD pitch bar must be centred.

(f) Select ALT HOLD mode.

- ALT HOLD mode selection push-button must illuminate, MAX CLIMB mode selection push-button must extinguish.

(g) Select MAX CLIMB mode.

- MAX CLIMB mode selection push-button must illuminate, ALT HOLD push-button must extinguish.

(h) Check that the throttle control levers are in max. thrust position.

(i) On AFCS datum adjust unit, act on NOSE UP-NOSE DOWN switch in NOSE DOWN direction for 5 to 10 secs.

- On First Officer's ADI, FD pitch bar must move downwards.

(4) MAX CRUISE mode with FD2 engaged.

(a) Check that FD2 is engaged in MAX CLIMB mode.

(b) Check that Vc and VMO pointers coincide on First Officer's airspeed indicator.

(c) On First Officer's channel, simulate a Mach number of 2 and an altitude of 48500 ft.

(d) Check that throttle control levers are in max. thrust position.

(e) Slowly increase altitude, checking at approximately 50200 ft. that :

- MAX CRUISE light illuminates.

- MACH HOLD mode selection push-button (AUTO-THROTTLE section) illuminates and remains on for approximately 100 secs.

- On First Officer's ADI, FD pitch bar is centred.

(f) On First Officer's channel, simulate a Mach number of 2.04 and an altitude of 52000 ft.

- MACH HOLD mode selection push-button (AUTO-THROTTLE section) must illuminate.

- Throttle control levers must move towards idle position.

- On First Officer's ADI, FD pitch bar must move upwards.

(g) Simulate a Mach number of 2, and move throttle control levers to max. thrust position.

- MACH HOLD mode selection push-button must extinguish.

- FD pitch bar must be centred.

(h) Move each throttle control lever, one by one, towards idle position. When last lever moves away from max. thrust position, check that :

- MACH HOLD mode selection push-button (AUTO-THROTTLE section) illuminates.

- FD pitch bar moves slightly upwards.

(i) Move throttle control levers back to max, thrust position.

- FD pitch bar must be centred.

- MACH HOLD mode selection push-button must extinguish.

(j) Select ALT HOLD mode.

- ALT HOLD mode selection push-button must illuminate.

- MACH HOLD mode selection push-button (AUTO-THROTTLE section) must illuminate.

- MAX CLIMB mode selection push-button and MAX CRUISE light must extinguish.

(k) Select MAX CLIMB mode.

- MAX CLIMB mode selection push-button and MAX CRUISE light must illuminate.

- MACH HOLD mode selection push-button (AUTO-THROTTLE section) must illuminate and remain on for approx. 100 secs.

(l) Disengage FD and autothrottle. Cancel AT warnings.

(m) On simulator, set AIR SPEED and ALTITUDE potentiometers to minimum stop position, and place SENSOR SIMUL switch in SENSOR position.

(n) Place ADC1 switch in ON position.

Q. Check of AP/FD - AT Incompatibility in Speed Modes

(1) Check that both AT switches are disengaged.

(2) Engage FD1 switch and select IAS HOLD mode on AP/FD section.

(a) IAS HOLD push-button must illuminate.

(3) Engage AT1 switch.

(a) The switch must remain engaged.

(b) On AUTOTHROTTLE section, IAS HOLD push-button must illuminate.

(c) FD1 must revert to PITCH HOLD mode.

(4) Select IAS HOLD mode on AP/FD section.

(a) IAS HOLD push-button must illuminate.

(b) AT1 switch must disengage and, on AUTOTHROTTLE section, IAS HOLD push-button must extinguish.

(c) On both Warning and Landing Display indicators, AT warning light must flash.

(5) Cancel AT warning.

(6) Select MAX CLIMB mode.

(a) MAX CLIMB push-button must illuminate.

(7) Engage AT1 switch.

(a) Switch must remain engaged. IAS HOLD mode selection push-button does not illuminate.

(b) FD1 must remain in max CLIMB mode.

(8) Engage AP1 switch, select MACH HOLD mode on AP/FD section, and disengage FD1 switch.

(a) MACH HOLD push-button must illuminate.

(b) AT1 switch must disengage.

(9) Engage AT1 switch.

(a) On AUTOTHROTTLE section, IAS HOLD must illuminate.

(b) AP must revert to PITCH HOLD mode.

(10) Disengage AP1 and AT1 switches and cancel AP and AT warnings.

(11) Engage FD1 switch. On AP/FD section, select IAS HOLD mode.

(a) IAS HOLD push-button must illuminate.

(12) Engage AT2 switch.

(a) The switch must remain engaged.

(b) On AUTOTHROTTLE section, IAS HOLD push-button must illuminate.

(c) FD1 must revert to PITCH HOLD mode.

(13) On AP/FD section, select IAS HOLD mode.

(a) IAS HOLD push-button must illuminate.

(b) AT2 switch must disengage and, on AUTOTHROTTLE section, IAS HOLD push-button must extinguish.

(14) Repeat above check procedure (from para. (1) to para (14)) with AP/FD No.2 and AT No.1, then AT No.2. Check that same results are obtained.

R. Check of ALT HOLD Mode

(1) With FD1 engaged.

(a) Simulate on Captain's channel an altitude of 1500 ft.

- Place ADC2 switch in OFF position.

- On pressure sensors simulator connected to ADC1, place SENSOR-SIMUL switch in SIMUL position, and using ALTITUDE potentiometers, simulate an altitude of 1500 ft. read on Captain's altimeter.

(b) Engage FD1 switch and select ALT HOLD mode.

- Switch must remain engaged.

- ALT HOLD mode selection push-button must illuminate.

- On Captain's ADI, FD pitch bar must be centred.

(c) Simulate an increase in altitude.

- On Captain's ADI, FD pitch bar must move downwards.

(d) Simulate a decrease in altitude.

- On Captain's ADI, FD pitch bar must move upwards

(e) Disengage FD. On simulator, set ALTITUDE potentiometers to minimum stop position and place SENSOR-SIMUL switch in SENSOR position.

(f) Place ADC2 in ON position.

(2) With FD2 engaged.

(a) Simulate on First Officer's channel an altitude of 1500 ft.

- Place ADC1 switch in OFF position.

- On pressure sensors simulator connected to ADC2, place SENSOR-SIMUL switch in SIMUL position, and simulate an altitude of 1500 ft., read on First Officer's altimeter.

(b) Engage FD2 switch and select ALT HOLD mode. Simulate an increase, then a decrease in altitude.

- Check on First Officer's ADI that FD pitch bar moves downwards then upwards.

(c) Disengage FD. Return ALTITUDE potentiometers to minimum stop position and place SENSOR SIMUL switch in SENSOR position.

(d) Place ADC1 switch in ON position.

S. Check of VERT SPEED Mode

(1) On Captain's and on First Officer's instrument panels, check that FD1/FD2 switches are placed in the associated FD position (FD1 position on Captain's side and FD2 position in First Officer's side).

(2) On AFCS control unit, engage FD1 and FD2 switches and select VERT SPEED mode.

(a) VERT SPEED mode selection push-button must illuminate.

(b) On Captain's ADI, the pitch bar must be centred.

(c) On First Officer's ADI, the pitch bar must not be visible.

(3) On AFCS datum adjust unit, act on AUTOPILOT NOSE UP/ NOSE DOWN switch in NOSE UP direction.

(a) On Captain's VSI, the commanded speed pointer must move upwards.

(b) On First Officer's VSI, both pointers must remain steady.

(c) On Captain's ADI, the pitch bar must move upwards.

(4) Act on NOSE UP - NOSE DOWN switch until the two pointers are facing on Captain's VSI.

(a) On Captain's ADI, the pitch bar must be centred.

(5) Engage AP1 switch and select VERT SPEED mode.

(6) On panel 2-213, trip circuit breaker 1F97, map. ref. A3.

(a) AP1 and FD1 switches must disengage.

(b) The flags must appear on Captain's VSI.

(c) FD2 must remain engaged in VERT SPEED mode and in First Officer's ADI, the pitch bar must appear.

(7) Cancel AP warnings, and reset circuit breaker 1F97.

(8) Act on AUTOPILOT NOSE UP - NOSE DOWN switch in NOSE DOWN direction.

(a) On First Officer's VSI, the commanded speed pointer must move downwards.

(b) On Captain's VSI, both pointers must remain steady.

(c) On First Officer's ADI, the pitch bar must move downwards.

(9) Act on NOSE UP - NOSE DOWN switch until pointers are facing on First Officer's VSI.

(a) On First Officer's ADI, the pitch bar must be centred.

(10) Engage AP2 switch and select VERT SPEED mode.

(11) On panel 13-216, trip circuit breaker 2F97 map. ref. B13.

(a) AP2 and FD2 switches must disengage.

(b) The flags must appear on First Officer's VSI.

(12) Cancel AP warnings and reset circuit breaker 2F97.

T. Check of ALT ACQ Mode and of ALTITUDE ALERT System

(1) Captain's channel

(a) On panel 15-215, set circuit breaker W533, map Ref. C1.

(b) Make certain that circuit breaker G293 (panel 3-213, map Ref. B8) is set.

(c) Not applicable.

(d) Simulate an altitude of 1500 ft., Captain's channel

- Place ADC2 switch in OFF position.

- On pressure sensors simulator connected to ADC1, place SENSOR-SIMUL switch in SIMUL position, and using ALTITUDE potentiometers, simulate an altitude of 1500 ft., read on Captain's altimeter.

(e) On AFCS control unit, select an altitude of 5000 ft.

(f) Carry out test of altitude alert warning lights as necessary.

(g) Engage FD1 switch and select ALT ACQ mode.

- PITCH HOLD mode selection push-button must illuminate.

- ALT ACQ prime indicator light must illuminate.

(h) Using pressure sensors simulator connected to ADC1, simulate an altitude of 5000 ft. Increase altitude so as to obtain an increase rate of approx. 3000 ft. per min. Check that :

- At 3800 ft. approx., on Captain's altimeter, altitude alert warning light illuminates. Altitude Alert aural warning sounds for two seconds.

- At 4000 ft. approx., ALT ACQ prime indicator light extinguishes, ALT ACQ mode selection push-button illuminates, PITCH HOLD mode selection push-button extinguishes.
On W & LD indicators, red AT lights flash.

- At 4700 ft. approx., altitude alert warning light extinguishes.

- At 5000 ft., ALT ACQ mode selection push-button extinguishes, ALT HOLD mode selection push-button illuminates.

(i) Engage AT1 switch.

(j) Using pressure sensors simulator connected to ADC1, slowly increase altitude until altitude alert warning light on Captain's altimeter flashes, and Altitude Alert aural warning sounds for 2 secs.

- Check that altitude is in the region of 5300 ft.

(k) Trip circuit breaker G293, panel 3-213, map Ref. B8.

- Altitude alert warning light must continue to flash.

(l) Reset circuit breaker G293.

- Altitude alert warning light must continue to flash.

(m) Not applicable.

(n) Not applicable.

(o) Not applicable.

(p) Disengage FD and autothrottle. On simulator, set ALTITUDE potentiometers to minimum stop position and place SENSOR-SIMUL switch in SENSOR position.

(q) Return ADC2 switch to ON position.

(r) Trip circuit breaker W533, panel 15-215, map Ref. C1.

(2) First Officer's channel

(a) On panel 15-216, set circuit breaker W534, map Ref. B27.

(b) Make certain that circuit breaker G295 (panel 1-213, map Ref. M18) is set.

(c) Place ADC1 switch in OFF position, and simulate an altitude of 1500 ft. on First Officer's channel.

(d) On AFCS control unit, select an altitude of 5000 ft.

(e) Engage FD2 switch and select ALT ACQ mode.

- PITCH HOLD mode selection push-button must illuminate.

- ALT ACQ prime indicator light must illuminate.

(f) Simulate an altitude of 5000 ft. Increase altitude so as to obtain an increase rate of approx. 3000 ft. per minute. Check that results are the same as those obtained on Captain's channel (altitude and warning displayed on First Officer's altimeter).

(g) Slowly increase altitude until altitude alert warning light flashes.

(h) Trip, then reset circuit breaker G295, panel 1-213, map Ref. M18.

- Check that altitude alert warning light continues to flash.

(i) Not applicable.

(j) Not applicable.

(k) Not applicable.

(l) Disengage FD and autothrottle. On simulator, set ALTITUDE potentiometers to minimum stop position, and place SENSOR-SIMUL switch in SENSOR position.

(m) Return ADC1 switch to ON position.

U. Check of AP1-AP2 Compatibility in Cruise Flight

(1) On AFCS control unit, engage AP1 switch.

(a) The switch must remain engaged.

(b) PITCH HOLD and HDG HOLD mode selection push-buttons must illuminate.

(2) Engage AP2 switch.

(a) The switch must remain engaged.

(b) AP1 switch must disengage.

(3) Engage AP1 switch.

(a) The switch must remain engaged.

(b) AP2 must disengage.

(4) Disengage AP1 switch and cancel warnings.

V. Check of BACK BEAM Mode

(1) Make certain that Captain's and First Officer's RAD/INS switches are in RAD position.

(2) On Captain's VOR-ILS-DME control unit display the LOC frequency indicated on ILS ground test unit.

(3) By means of the ground test unit, simulate a LOC beam deviation to the left.

(4) Engage AP1 and FD1 switches.

(a) The two switches must remain engaged.

(b) PITCH HOLD and HDG HOLD mode selection push-buttons must illuminate.

(5) Select BACK BEAM mode.

(a) BACK BEAM mode selection push-button must not illuminate, and HDG HOLD and PITCH HOLD push-buttons must remain illuminated.

(6) Disengage AP1 switch and cancel warnings.

(a) HDG HOLD mode push-button must extinguish.

(7) Select BACK BEAM mode.

(a) BACK BEAM mode selection push-button must illuminate.

(b) On Captain's ADI, the roll bar must move to the left.

(8) Place Captain's RAD/INS switch in INS position.

(a) FD1 switch must disengage.

(9) Place Captain's RAD/INS switch in RAD position.

(10) On First Officer's VOR-ILS-DME control unit, display the LOC frequency indicated on the ILS ground test unit, and simulate a deviation of aircraft to the right of LOC beam.

(11) Engage AP2 and FD2 switches, and select BACK BEAM mode.

(a) BACK BEAM mode selection push-button must not illuminate.

(12) Disengage AP2 switch, cancel AP warnings and select BACK BEAM mode.

(a) BACK BEAM mode selection push-button must illuminate.

(b) On First Officer's ADI, FD roll bar must move to the right.

(13) Place First Officer's RAD/INS switch in INS position.

(a) FD2 switch must disengage.

(14) Place First Officer's RAD/INS switch in RAD position.

(15) Disconnect ground test unit.

W. Check of LOC and GLIDE Modes

(1) Prepare

(a) Check that the two radio altimeter indicators are not operating.

(b) Connect radio altimeter ground test unit to the Captain's side (First Officer's side) and connect ground telephones.

(c) Operate both radio altimeters and display a decision height of 0 foot. Check that the OFF flag mask and the red flag disappear from both indicators.

(d) By means of the radio altimeter ground test unit, simulate an altitude of 1600 feet on Captain's side (First Officer's side).

(e) Make certain that Captain's (First Officer's) RAD/INS switch is in RAD position.

(f) On Captain's and First Officer's VOR-ILS-DME control units, display the ILS frequency indicated on the ILS ground test unit.

(g) By means of the ILS ground test unit, simulate a deviation to the left of LOC beam and below GLIDE beam (deviation sufficient to prevent capture and to prevent appearance of LOC and GLIDE flags on ADIs).

<u>NOTE</u> : Position of aircraft in relation to GLIDE and LOC beams is determined with observer considered to be inside the aircraft, facing the runway. E.g. deviation to the left : aircraft to left of LOC beam.

(h) Place ADC2 switch in ON position.

(2) Check of VOR/LOC and GLIDE prime indicator lights.

(a) Engage FD1 (FD2) switch and select ALT HOLD and HDG/TRK modes.

(a1) ALT HOLD and HDG/TRK mode selection pushbuttons must illuminate.

(a2) On Captain's (First Officer's) ADI, the pitch and roll bars must be centred.

(b) Select VOR/LOC mode.

(b1) VOR/LOC prime indicator light must illuminate.

(c) Select HDG HOLD mode.

(c1) VOR/LOC prime indicator light and HDG/TRK push-button must extinguish.

(d) Select HDG/TRK mode.

(d1) HDG/TRK mode selection push-button must illuminate.

(e) Select GLIDE mode.

(e1) GLIDE and VOR/LOC prime indicator lights must illuminate.

(e2) On each W & LD indicator, check that the aircraft symbol, the RH LOC deviation bar, and the upper GLIDE deviation bar are illuminated.

(f) Select PITCH HOLD mode.

(f1) GLIDE and VOR/LOC prime indicator lights, ALT HOLD and HDG/TRK push-buttons must extinguish.

(f2) PITCH HOLD mode selection push-button must illuminate.

(f3) On each W & LD indicator, aircraft symbol and beam deviation bars must extinguish.

(g) Select ALT HOLD and HDG/TRK modes.

(g1) ALT HOLD and HDG/TRK mode selection push-buttons must illuminate.

(h) Select GLIDE mode.

(h1) GLIDE and VOR/LOC prime indicator lights must illuminate.

(i) Check that ILS test is inhibited.

(3) Glide capture

(a) Gradually decrease Glide deviation until capture is initiated.

(a1) GLIDE push-button must illuminate.

(a2) GLIDE prime indicator light and ALT HOLD mode selection push-buttons must extinguish.

(a3) On each W & LD indicator, AT warning light must flash.

(a4) On Captain's (First Officer's) ADI, the FD pitch bar must move upwards to centre position.

(b) On ADC control panel, press ADC1 (ADC2) caption light, place ADC1 (ADC2) selector switch in TEST 1 position, place ADC2 (ADC1) selector switch in OFF position. When data have stabilized, release caption light.

(b1) FD1 (FD2) switch must remain engaged.

(c) On AFCS control unit, display the speed shown on Captain's (First Officer's) air speed indicator, engage AT1 (AT2) switch, and select IAS ACQ mode.

(c1) IAS ACQ mode selection push-button must illuminate.

(c2) AT warning lights must extinguish.

(4) Glide Capture and Loc Track

(a) Cancel Glide deviation

(a1) On Captain's (First Officer's) ADI, the pitch bar must be centred.

(a2) On each W & LD indicator, the upper GLIDE deviation bar must be extinguished.

(b) Gradually decrease LOC beam deviation until capture is initiated :

(b1) VOR/LOC mode selection push-button must illuminate.

(b2) VOR/LOC prime indicator light and HDG/TRK mode selection push-button must extinguish.

(b3) On Captain's (First Officer's) ADI, the FD roll bar must move to the right, to centre position.

(c) Cancel LOC beam deviation

(c1) On Captain's (First Officer's) ADI, the roll bar must be centred.

(c2) On each W & LD indicator, LOC deviation bar and aircraft symbol must be extinguished.

(c3) At Flight Engineer's station, on COMPASS COUPLER control unit, both DG caption lights must illuminate.

(d) Using ILS ground test unit, simulate a GLIDE deviation.

(d1) On Captain's (First Officer's) ADI FD pitch bar must move.

(e) Cancel GLIDE deviation.

(f) On overhead panel, Flight Control Unit, place ANTI STALL SYSTEM 1 switch in OFF position.

(f1) PITCH switch on AUTOSTAB No.1 unit must remain engaged.

(g) Return ANTI STALL SYSTEM 1 to ON position and place ANTI STALL SYSTEM 2 switch in OFF position.

(g1) PITCH switch on AUTOSTAB No.2 unit must remain engaged.

(h) Return ANTI STALL SYSTEM 2 switch to ON position.

(i) Engage AP1 (AP2) switch.

(i1) AP must engage in FD modes.

(j) By means of radio altimeter ground test unit, simulate an altitude within 1500 to 600 feet.

(k) On ADC control panel, place ADC1 (ADC2) switch in OFF position.

(k1) AP1 and FD1 (AP2 and FD2) switches must remain engaged.

(l) Place ADC1 (ADC2) selector switch in ON and then in TEST 1 position and cancel warnings.

(m) Simulate an altitude within 600 to 200 feet.

(n) On ADC control panel, place ADC2 (ADC1) switch in ON position, then press ADC1 (ADC2) warning light cancel the general ADC warning.

(n1) FD1 (FD2) switch must remain engaged. remain engaged.

(n2) On master warning panel, ADS warning light must illuminate ; on Captain's and First Officer's air speed indicators, flags must appear.

(n3) On Captain's and First Officer's instrument panels, both AUTOLAND red warning lights must flash.

(o) Disengage AP1 (AP2) switch and cancel AP warning.

(o1) AUTOLAND warning lights must extinguish.

(p) On ADC control panel, place ADC2 (ADC1) switch in OFF position, and release ADC2 (ADC1) warning light.

(q) Disengage AT1 (AT2) switch and engage AP1 (AP2) switch.

(q1) On each W & LD indicator, AT red warning light must flash.

(q2) AUTOLAND warning lights must flash.

(r) Cancel AT warnings and push the 4 throttle control levers in max thrust position.

(r1) On AFCS control unit, GO AROUND caption light must illuminate, VOR/LOC and GLIDE mode selection push-buttons must extinguish.

(r2) AUTOLAND warning lights must extinguish.

(r3) On Captain's (First Officer's) ADI, the FD pitch bar must move upwards.

(s) Pull the 4 throttle control levers rearwards and select HDG HOLD mode.

(s1) GO AROUND caption light must extinguish.

(s2) PITCH HOLD and HDG HOLD mode selection push-buttons must illuminate.

(t) Select GLIDE mode, disengage AP and cancel AP warnings.

(t1) GLIDE and VOR/LOC mode selection push-buttons must illuminate.

(u) On Captain's (First Officer's) radio altimeter, display a decision height of 200 feet.

(v) By means of ILS ground test unit, simulate a GLIDE deviation which will result in illumination of a GLIDE beam deviation bar on W & LD indicators.

(w) Simulate an altitude below 100 feet.

(w1) Check that, at 200 feet height, DH caption lights illuminate on Captain's (First Officer's) W & LD indicator and both ADIs.

(w2) At 100 feet height, GLIDE deviation bars must estinguish.

(x) Disengage FD1 (FD2) switch.

(y) Stop both radio altimeters and place ADC1 and ADC2 selector switches in ON position. Press ADC1 and ADC2 warning lights to cancel warnings. Engage systems which have disengaged during these operations. Connect radio altimeter ground test unit to First Officer's side.

(z) To carry out check with AP/FD No.2 engaged, repeat operations described from (1)(c) to 4(x). taking into account the information given in parentheses.

R X. Check of LAND Mode

(1) Prepare

R (a) Set flight controls to Blue electrical mode.

R (b) On AFCS control unit, check that VOR-LOC counters
R display aircraft heading.

R (c) Check that Captain and First Officer RAD-INS
R switches are in RAD position.

R (d) Place ADC1 and ADC2 TEST selector switches in
R TEST 2 position.
R Press amber ADC1 and ADC2 warning lights briefly.

R (e) Trip, safety and tag the following circuit
R breakers :

	SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
R	NOSE UC WEIGHT SW A SYS SUP	1-213	G 281	M16
R	LH UC WEIGHT SW A SYS SUP		G 292	M17
R	RH UC WEIGHT SW B SYS SUP	3-213	G 294	B 9
R	NOSE UC WEIGHT SW B SYS SUP		G 296	D 8

R (f) Place pitch trim control wheel in 0° position
R and place throttle control levers in mid-way
R position.

R (g) With both radio altimeters shut down, connect and
R start up radio altimeter ground test unit at
R Captain (First Officer) side and connect ground
R service telephones.

R (h) Start up both radio altimeters and select a
R decision height of 0 ft.

R (i) Simulate a radio altitude of 1600 ft. at Captain
R (First Officer) side.

R (j) On Captain and First Officer VOR-ILS-DME control
R units, select ILS frequency of VOR/ILS ground
R test unit.

R (k) Use VOR/ILS ground test unit to simulate an aircraft deviation to the right of LOC beam and above GLIDE beam (these deviations must be sufficient to be outside capture range and to keep ADI Loc and GLIDE flags out of view).

R (2) Test

R (a) On AFCS control unit AT section, select an airspeed of 555 kt.

R (b) Engage AT1 (AT2), ET1 (ET2) and FD1 (FD2).

R (b1) Engaged switches must remain engaged.

R (c) Select IAS ACQ, HDG HOLD and ALT HOLD modes.

R (c1) Corresponding mode selection push-button must illuminate.

R (c2) On ADIs, pitch and roll bars must be centered.

R (d) Select LAND mode.

R (d1) LAND prime, VOR/LOC prime and GLIDE prime indicator lights must illuminate.

R (d2) On each W & LD indicator, aircraft symbol, LH LOC deviation bar and lower GLIDE deviation bar must be illuminated.

R (e) Engage AP1 (AP2).

R (e1) Switch must remain engaged and LAND 2 capability caption light on each W & LD indicator must illuminate.

R (f) Engage AP2 (AP1).

R (f1) Switch must remain engaged and LAND 3 capability captain lights must illuminate.

R (g) Disengage AP1 and AP2.

R (g1) LAND 2 and LAND 3 capability caption lights must extinguish.

R (h) Slowly decrease GLIDE deviation to zero.

R (h1) On Captain (First Officer) ADI, pitch bar

R must centre.

R (h2) On each W & LD indicator, GLIDE deviation
R bar must extinguish.

R (h3) GLIDE mode selection push-button must illu-
R minate.

R (h4) ALT HOLD mode selection push-button must
R extinguish.

R (i) Slowly decrease LOC deviation until LOC capture.

R (i1) On Captain (First Officer) ADI, roll bar
R must move towards centre.

R (i2) On each W & LD indicator, LOC deviation
R bars must extinguish.

R (i3) LOC mode selection push-button must illu-
R minate.

R (i4) HDG HOLD mode selection push-button must
R extinguish.

R (j) Cancel LOC deviation to reach LOC TRK conditions.

R (j1) LAND mode selection push-button must illu-
R minate.

R (j2) GLIDE and LOC mode selection push-buttons
R must extinguish.

R (j3) Captain (First Officer) ADI roll bar must
R be centred.

R (k) Trip circuit breaker 1R25 (2R25) on panel 2-213
R (13-216), Map Ref. G6 (E15).

R (k1) On Captain (First Officer) ADI, pitch and
R roll bars must disappear and ILS warning
R flags must appear.

R (l) Engage AP1 (AP2).

R (l1) Switch must remain engaged.

R (l2) On each W & LD indicator, LOC and GLIDE
R deviation bars and aircraft symbol must
R flash and LAND 2 capability caption light
R must be illuminated.

R (m) Reset circuit breaker 1R25 (2R25).

R (m1) ADI pitch and roll bars must re-appear.

R (m2) On each W & LD indicator, LOC and GLIDE
R deviation bars and aircraft symbol must
R extinguish.

R (n) Disengage AP1 (AP2).

R (n1) LAND 2 capability caption lights must extin-
R guish.

R (o) Cancel warnings

R (p) Simulate a radio altitude of 400 ft.

R (q) Engage AP1 (AP2).

R (q1) Switch must remain engaged.

R (q2) LAND 2 capability caption lights must illu-
R minate.

R (r) Disengage AT1 (AT2).

R (r1) On instrument panels, the two red AUTO LAND
R warning lights must flash.

R (r2) On master warning panel, AT warning light
R must flash.

R (r3) LAND 2 capability caption lights must extin-
R guish.

R (s) Engage AT1 (AT2) in IAS ACQ mode.

R (s1) AUTO LAND warning lights must continue to
R flash.

R (s2) LAND 2 capability caption lights must illu-
R minate.

R (t) Press Captain AUTO LAND warning light.

R (t1) Captain and First Officer AUTO LAND warning
R lights must extinguish.

R (u) Simulate a radio altitude of 150 ft.

R (v) Simulate an excessive GLIDE deviation.

R (v1) AUTO LAND warning lights must start flashing.

R (v2) On each W & LD indicator, corresponding GLIDE deviation bar and aircraft symbol must illuminate.

R (w) Push the four throttle control levers rapidly towards max. thrust position.

R (w1) GO AROUND indicator light must illuminate.

R (w2) AT1 (AT2) switch must disengage and AT warning must appear.

R (w3) AUTO LAND warning lights must extinguish.

R (w4) On Captain (First Officer) ADI, roll bar must center and pitch bar must move upwards.

R (x) Disengage ET1 (ET2).

R (x1) AP1 (AP2) must remain engaged.

R (y) Engage ET1.

R (z) Place throttle control levers in mid-way position.

R (aa) Engage AT1 in IAS ACQ mode.

R (ab) Select HDG HOLD mode.

R (ab1)GO AROUND indicator light must extinguish.

R (ab2)PITCH HOLD and HDG HOLD mode selection push-buttons must illuminate.

R (ac) Select LAND mode and cancel GLIDE deviation.

R (ac1)LAND mode selection push-button must illuminate.

R (ac2)LAND 2 capability caption light must illuminate.

R (ad) On Captain radio altimeter indicator select a decision height of 100 ft.

R (ae) Shut down VOR/ILS ground test unit.

R (ae1)On each W & LD indicator, LOC and GLIDE

R deviation bars must flash.

R (ae2)AUTO LAND warning lights must flash.

R (af) Simulate a radio altitude decreasing down to
R h $\leq$ 75 ft. and check that :

R (af1)At 100 ft., DH caption lights on ADIs and
R W & LD indicators illuminate.

R (af2)Below 100 ft., yaw pointer appears on each
R ADI.

R (af3)At 75 ft., GLIDE deviation bars extinguish.

R (ag) Start up VOR/ILS ground test unit again.

R (ah) Pull control column back (AP force limiter
R compressed).

R (ah1)AP1 (AP2) switch must remain engaged.

R (ai) Release control column.

R (aj) Simulate a radio altitude of 50 ft.

R (aj1)On Captain (First Officer) WKLD indicator,
R F caption light must illuminate.

R (aj2)Control column must move back.

R (ak) Simulate a radio altitude of 20 ft.

R (al) On AFCS control unit, simulate a LOC deviation
R of 10°.

R (al1)Control wheel must not move.

R (am) Cancel LOC deviation.

R (an) Simulate a radio altitude of 0 ft. and check
R that :

R (an1)At 15 ft. throttle control levers move to
R flight idle position.

R (ao) Disengage AP1 and FD1 (AP2 and FD2) and cancel
R warnings.

R (ap) For AP/FD2, repeat tests from paragraph (1) (b),
R referring to information between parentheses.

R (aq) Remove safety clips and tags and reset the following circuit breakers :

	SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
R	NOSE UC WEIGHT SW A SYS SUP	1-213	G 291	M16
R	LH UC WEIGHT SW A SYS SUP		G 292	M17
R	RH UC WEIGHT SW B SYS SUP	3-213	G 294	B 9
R	NOSE UC WEIGHT SW B SYS SUP		G 296	D 8

Y. Check of Runway Guidance

(1) On AFCS control unit, check that VOR LOC counters indicate the heading of the aircraft.

(2) Operate both radio altimeters, and simulate an altitude of 1600 ft.

(3) Engage FD1 switch and select LAND mode.

(4) By means of ILS ground test unit, simulate GLIDE and LOC captures.

(a) LAND mode selection push-button must illuminate.

(b) On Captain's ADI, the FD roll and pitch bars must be visible.

(5) Simulate on Captain's side an altitude below 100 ft.

(a) When altitude falls to 100 ft., yaw pointer must appear on Captain's ADI.

(6) On AFCS control unit, act on VOR LOC1 knob.

(a) The yaw pointer must deflect.

(7) Set yaw pointer to centre position.

(8) Engage FD2 switch and disengage FD1 switch.

(a) On First Officer's ADI, FD roll and pitch bars must be visible.

(9) Simulate on First Officer's side an altitude below 100 ft.

(a) When altitude falls to 100 ft. yaw pointer must appear on First Officer's ADI.

(10) On AFCS control unit, act on VOR LOC2 knob.

(a) The yaw pointer must deflect.

(11) Disengage FD2 switch and disconnect ILS ground test unit.

Z. Check of AP1/AP2 Change Over

(1) On Captain's (First Officer's) control units, display an ILS frequency.

(2) Engage AP2 switch.

(a) The switch must remain engaged.

(b) PITCH HOLD and HDG HOLD mode selection push-buttons must illuminate.

(3) On AFCS datum adjust unit, act on AUTOPILOT NOSE UP-NOSE DOWN switch in NOSE UP direction.

(a) Control column must move, elevons must deflect.

(4) Select LAND mode.

(a) VOR/LOC, GLIDE and LAND prime indicator lights must illuminate.

(5) Engage AP1 switch.

(a) Both AP switches must remain engaged.

(6) On ceiling panel, on RELAY JACK control unit, place GREEN ONLY-NORM-BLUE ONLY selector switch in BLUE ONLY position.

(7) Act on NOSE UP-NOSE DOWN switch in NOSE DOWN direction.

(a) Control column must move, elevons must deflect.

(8) Place GREEN ONLY-NORM-BLUE ONLY selector switch in NORM position.

(9) Disengage AP1 switch.

(10) Act on NOSE UP-NOSE DOWN switch.

(a) Elevons must deflect.

(11) Disengage AP2 switch and cancel warnings.

AA. Close-Up

R (1) Carry out close-up required for engagement of both APs and both FDs (Ref. 22-10-00, Servicing).

(2) Disconnect electrical ground power unit, and de-energize the aircraft electrical network (Ref. 24-41-00, Servicing).

R (3) Carry out close-up required for procedure to set
R flight controls in electrical mode (Ref. 27-00-00,
R Servicing).

R (4) Disconnect ground test units.

R (5) Disconnect shunts from AP/FD computer test connectors.

(6) Remove safety clips and tags, and reset the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
STICK SHAKER SUP	1-213	W 513	P15
ALT ALERT SYS COMP 1 SUP	15-215	W 533	C 1
ALT ALERT SYS COMP 2 SUP	15-216	W 534	B27

END OF THIS SECTION

NEXT

1. General
(Ref. Fig. 001)
(Ref. Fig. 002)

A. The AP/FD system controls and interlocks include the following components :

(1) One AFCS control unit installed in the glareshield instrument panel. It consists of two sections. Only the section associated with the AP/FD is described in this topic (the section associated with the Autothrottle is described in 22-31-00, Description and Operation).

(2) One datum adjust unit located in the centre console. It consists of two sections (for autothrottle section, Ref. 22-31-00, Description and Operation).

(3) Two AP/FD pitch computers which provide aircraft control around the pitch axis (Ref. 22-12-00, Description and Operation).

(4) Two AP/FD azimuth computers which provide aircraft control around the roll and yaw axes (Ref. 22-13-00, Description and Operation).

(5) Two AP disconnect (A/P D1SC) push-buttons located on the Captain control column handwheel and First Officer control column handwheel.

(6) Three AP force limiters (Ref. Fig. 002). These are located in zone 121 (access door 121F8).

B. Interlocks internal to one channel are described in the topic dealing with the channel.

Only the circuits common to both channels are described in this chapter :

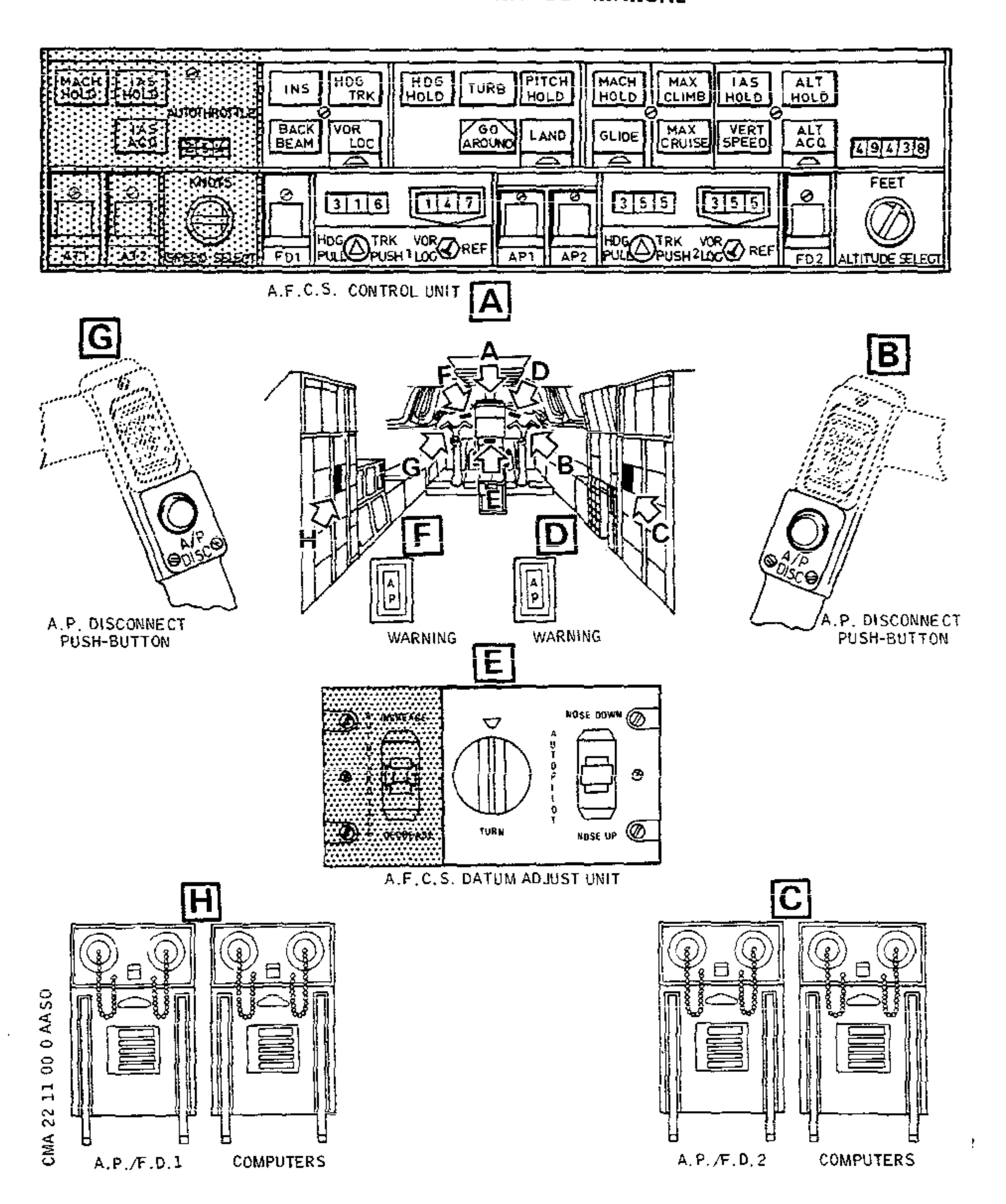
(1) AP engagement.

(2) FD engagement.

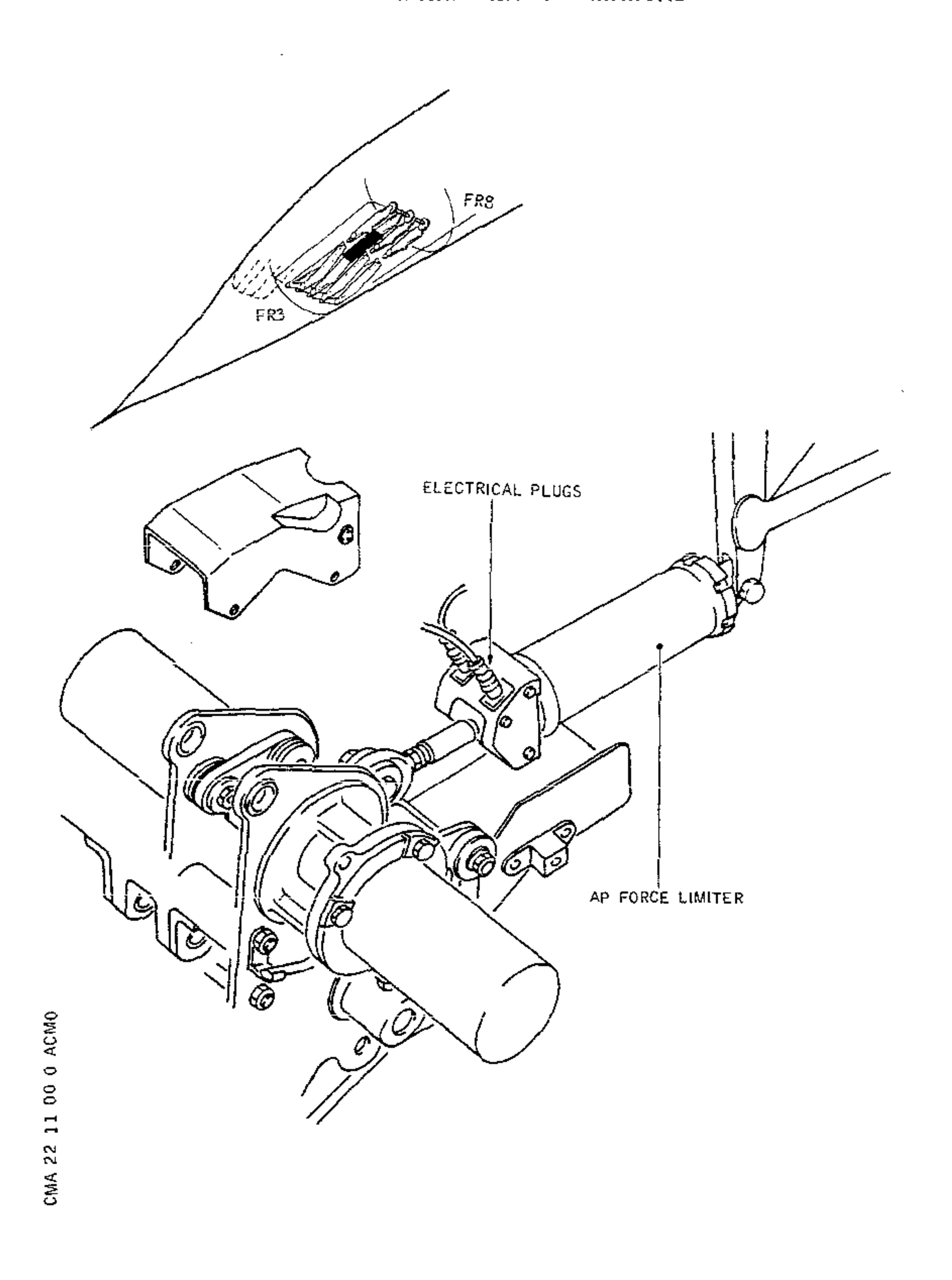
(3) AP instinctive disconnection.

(4) AP force limiters.

(5) +15V and -15V logic signals generation.



AP/FD System Components
Figure 001



AP Force Limiter
Figure 002

(6) Altitude alert system.

2. Control Unit - AFCS

A. Description (Ref. Fig. 003)

This unit is installed in the glareshield instrument panel, above the centre instrument panel between the Captain and First Officer stations.

The part associated with the AP/FD includes :

(1) Engage switches.

These AP1, AP2, FD1 and FD2 switches are located on the lower part of the unit.

(2) Mode selection push-buttons

These push-buttons, located on the upper part of the unit, are divided into three sections.

(a) RH section, pitch mode selection push-buttons :

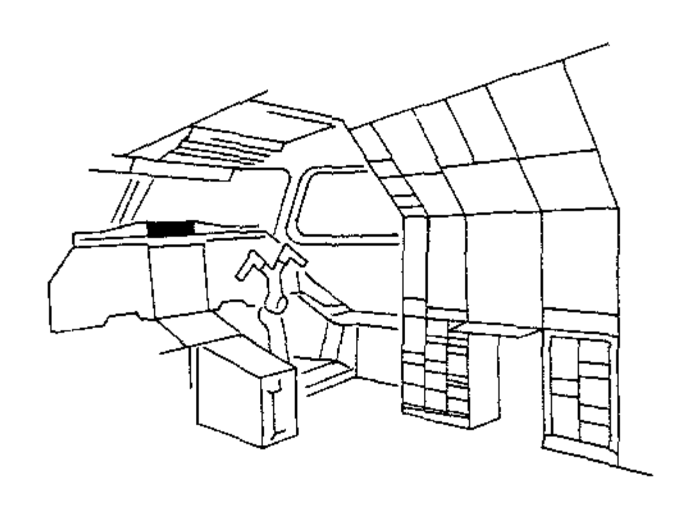
- MACH HOLD : Mach holding
- MAX CLIMB and MAX CRUISE : Climb and cruise mode
- IAS HOLD : indicated airspeed holding
- ALT HOLD : Altitude holding
- ALT ACQ : Selected altitude acquisition
- VERT SPEED : Vertical speed holding
- GLIDE : Capture and holding of GLIDE beam

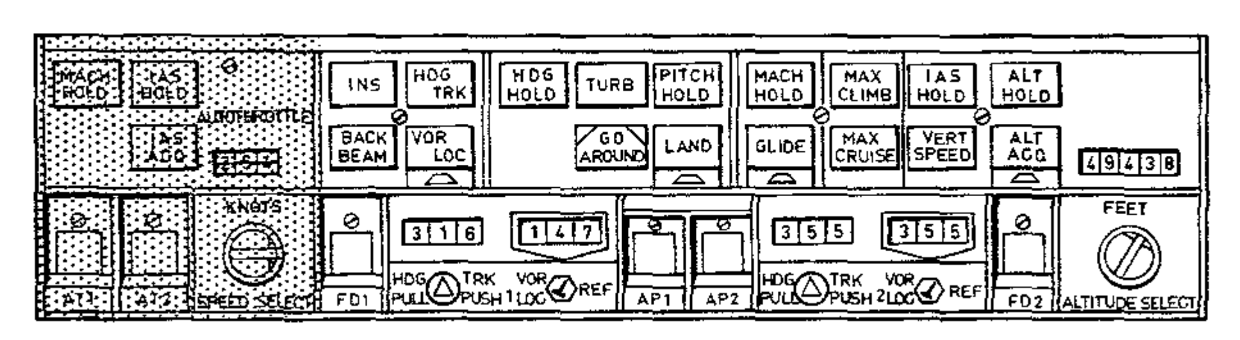
(b) LH section, azimuth mode selection push-buttons :

- INS : Inertial Navigation mode
- TRK/HDG : Heading or course selection and holding mode
- VOR/LOC : VOR navigation mode or LOC approach mode
- BACK BEAM : Approach on back-beam (LOC)

(c) Central section, common and basic selection push-buttons :

- HDG HOLD : Basic mode, for holding the heading existing at the time of AP engagement
- PITCH HOLD : Basic mode, for holding the attitude existing at the time of engagement
- TURB : Common mode, for holding heading and attitude during high turbulences
- LAND : Common mode, for automatic landing and approach
- GO AROUND : Automatic throttle control.





CMA 22 11 00 0 AES 0

AFCS Control Unit
Figure 003

(3) Selection knobs

(a) ALTITUDE SELECT

This knob is used to select an altitude, which is displayed in the FEET window located above. It is common to AP/FD 1 and AP/FD 2.

(b) VOR/LOC

These two knobs are used by the pilots to select the runway magnetic heading or VOR radial, for AP/FD 1 and AP/FD 2 respectively. The selected value is displayed on the associated digital counter located above the knob.

(c) HDG/TRK

These two knobs enable a desired heading or course to be selected by the pilots, for AP/FD 1 and AP/FD 2 respectively. The selected value is displayed on the digital counter located above the knob.

B. Operation

(1) Engage switches

Each AP or FD switch is held in the engaged position by means of two electromagnetic coils. One is supplied by the control logic, the other by the monitoring logic. Active engagement is obtained when control and monitoring logic circuits energize both engage switch self holding coils. It is possible to override the electromagnetic force holding the two coils manually.

The logic circuits holding these engage switches are contained in the pitch and azimuth computers.

- For AP engage switches see paragraph 4.
- For FD engage switches see paragraph 5.

NOTE : On engagement of either, autopilot the associated green AP indicator light located on the AFCS control unit illuminates as well as the HDG HOLD and PITCH HOLD (basic modes) mode selection push-buttons.

(2) Mode selection push-buttons

As soon as an AP is engaged, there is automatic enga-

gement of the basic modes and PITCH HOLD and HDG HOLD mode selection push-buttons illuminate.
Another mode can be selected by pressing the associated push-button. Selection of this mode is indicated by :

- Extinction of the push-button associated with the mode previously engaged in this axis (only one mode at a time can be engaged in one axis)
- Illumination of the pressed push-button.

NOTE : A common mode (TURB or LAND) selection is indicated by the extinction of the two push-buttons associated with the two modes previously engaged in the two axes.

A capture mode (VOR/LOC, LAND, GLIDE or ALT ACQ) selection is indicated by the illumination of a small prime indicator light, located immediately under the selection push-button. Illumination of indicator light confirms that the mode has been armed (or pre-selected) and provides the pilot with the possibility of monitoring the sequence displays.
The prime indicator light extinguishes during capture and at the same time the selection push-button illuminates indicating to the pilot that the mode is engaged.

The prime indicator light can be extinguished, i.e. mode selection cancelled, only by selecting the basic mode in the relevant axis.

If the pilot selects an AP/FD speed mode (IAS HOLD or MACH HOLD), the autothrottle being engaged in either mode, the AT system is automatically disengaged and the AP/FD engages in the selected mode.

If the pilot engages the autothrottle, the AP/FD being engaged in a speed mode, the AP/FD engaged in the pitch axis comes back automatically to PITCH HOLD and the autothrottle engages in its basic IAS HOLD mode.

If the pilot selects MAX CLIMB mode with autothrottle engaged, the autothrottle remains engaged but declutched; no mode illuminated.

Upon automatic engagement of MAX CRUISE mode, the autothrottle clutches with MAX HOLD illumi-

nated.

If the AP/FD is engaged in a speed mode with ALT ACQ mode pre-selected, the autothrottle can be engaged but it will be active in the basic mode only on flight level capture or on AP/FD speed mode disengagement before capture.

If the autothrottle is not engaged, the autothrottle warnings are activated during capture.

(3) Selection knobs

(a) ALTITUDE SELECT

This knob drives 4 synchro transformers (2 for AP/FD 1, 2 for AP/FD 2) through a gearing assembly. They transmit altitude error signals used by the AP/FD for the ALT ACQ mode.
These synchros are linked to the ADC resolvers.

(b) VOR/LOC

Each knob drives 4 synchros through a gearing assembly.

Two synchro transformers transmit a route error signal used by the AP/FD for VOR, LOC and LAND modes from heading information provided by the associated compass coupler.

A differential synchro transmits a route error signal used by the HSI to move the VOR or LOC route index to be followed from heading information provided by compass coupler 1 or 2.

A differential synchro transmits an angular deviation signal which is used by the VOR receiver to produce the VOR BEAM ERROR signal used by the AP/FD for VOR mode.

(c) HDG/TRK

Each knob drives through a gearing assembly a differential synchro which transmits a heading error signal used by the track heading unit to produce the HDG/TRK ERROR signal used by the AP/FD for the HDG/TRK mode.

This knob also drives mechanically a switch which is placed in ON position when pressed, en-

gaging a drift detector synchro in the track heading unit.

(4) Mode push-button illumination and filament tests

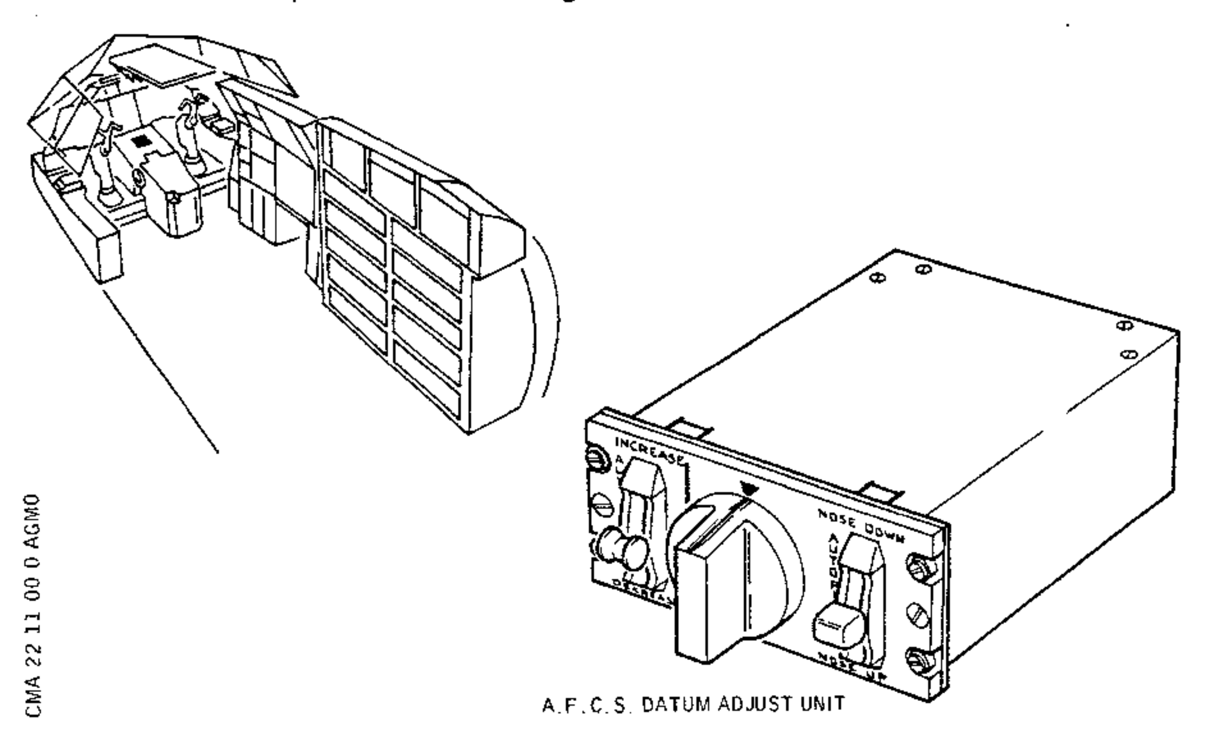
The selection push-button and prime indicator lights are equipped with two lamps (one on each side). Each lamp is supplied through the logic system of the mode involved. These logic circuits are located in the AP/FD pitch and azimuth computers.

A device consisting of a rotary selector switch and a transformer enables the lighting intensity to be adjusted. The AFCS MODES rotary selector switch is located on panel 6-211.

Two 3-position D/B LIGHT switches located in the RH and LH side consoles, enable all lamps of the AFCS control unit to be tested.

3. Datum Adjust Unit - AFCS

A. Description (Ref. Fig. 004)



AFCS Datum Adjust Unit
Figure 004

This unit is fitted in the centre console forward of the throttle control levers.
The AP/FD section consists of two control switches.

(1) AUTOPILOT (NOSE DOWN-NOSE UP) switch

This control is linked to the AP/FD pitch channel. This switch is provided with a return-to-neutral spring and has 2 positions in each direction (slow and fast adjustment)

(2) TURN knob

This control is linked to the AP/FD azimuth channel. The maximum rotation angle of this knob is ± 120° corresponding to maximum turns of 35°.

B. Operation

(1) AUTOPILOT (NOSE DOWN-NOSE UP) switch

This switch controls parameter changes in the various AP pitch hold modes.
The following modes are affected by this control :

- PITCH HOLD : Provides the desired value of attitude change whatever the aircraft speed, with two load factor limits : 0.05 g (1st position) and 0.15 g (2nd position)
- ALT HOLD : Provides an altitude change of ± 600 feet with two variation rates : 23 feet/second (1st position), 70 feet/second (2nd position)
- IAS HOLD : Provides an IAS adjustment of ± 20 Kt with two variation rates : 0.7 Kt/second (1st position), 2 Kt/second (2nd position)
- MACH HOLD : Provides the existing MACH with an adjustment of ± 0.06 MACH with 2 variation rates : 0.002 MACH/second (1st position), 0.007 MACH/second (2nd position).
- MAX CLIMB : Provides a speed change of ± 16 Kt, with two variation rates : 0.9 Kt/second (1st position) 2.9 Kt/second (2nd position)
- VERT SPEED : Enables the vertical speed to be adjusted throughout the whole scale of the vertical speed indicator (6000 ft/min.) with the following variation rates : 80 ft/min./second (1st position), 800 ft/min./second (2nd position).

The pilot may operate this control with only the FD engaged, in order to set the FD bar on the ADI to zero at the value of the parameter to be held chosen by the pilot.

(2) TURN knob

The TURN knob controls turns in the basic mode of the AP azimuth channel : HDG HOLD (in AP only)

This control makes the aircraft turn up to 35° (for 120°-knob rotation) with a turn rate of 5°/second

The aircraft heading held corresponds to that existing when the control knob comes back to zero.

The AP cannot be engaged if the TURN knob is not in its neutral position.

Operation of the turn knob in any mode other than LAND

or GO AROUND necessarily involves an automatic return to the HDG HOLD basic mode.

4. AP Engage Logic

A. General (Ref. Fig. 005)

The engagement logic circuits of the AP are located in the pitch computers.
These circuits are paired (control and monitoring)
For clarity only the control channel is shown in the schematic.
The engage logic of each AP can be broken down into three parts, detailed below in order :

(1) SERVO INHIBIT (SI) signal

This takes into account selection of the corresponding engage switch, pitch computer internal monitoring and monitoring of the principal external information.

(2) SERVO ARM (SA) signal

This controls opening of the corresponding electrovalves (EV) on the relay jacks (RJ), thus pressurizing the servovalves (SV) and locking the input levers on the relay jack body.
The CENTRE LOCKS logic signal confirms input lever locking.

(3) HOLD signal

This allows generation of the voltages necessary to hold the engage switch.

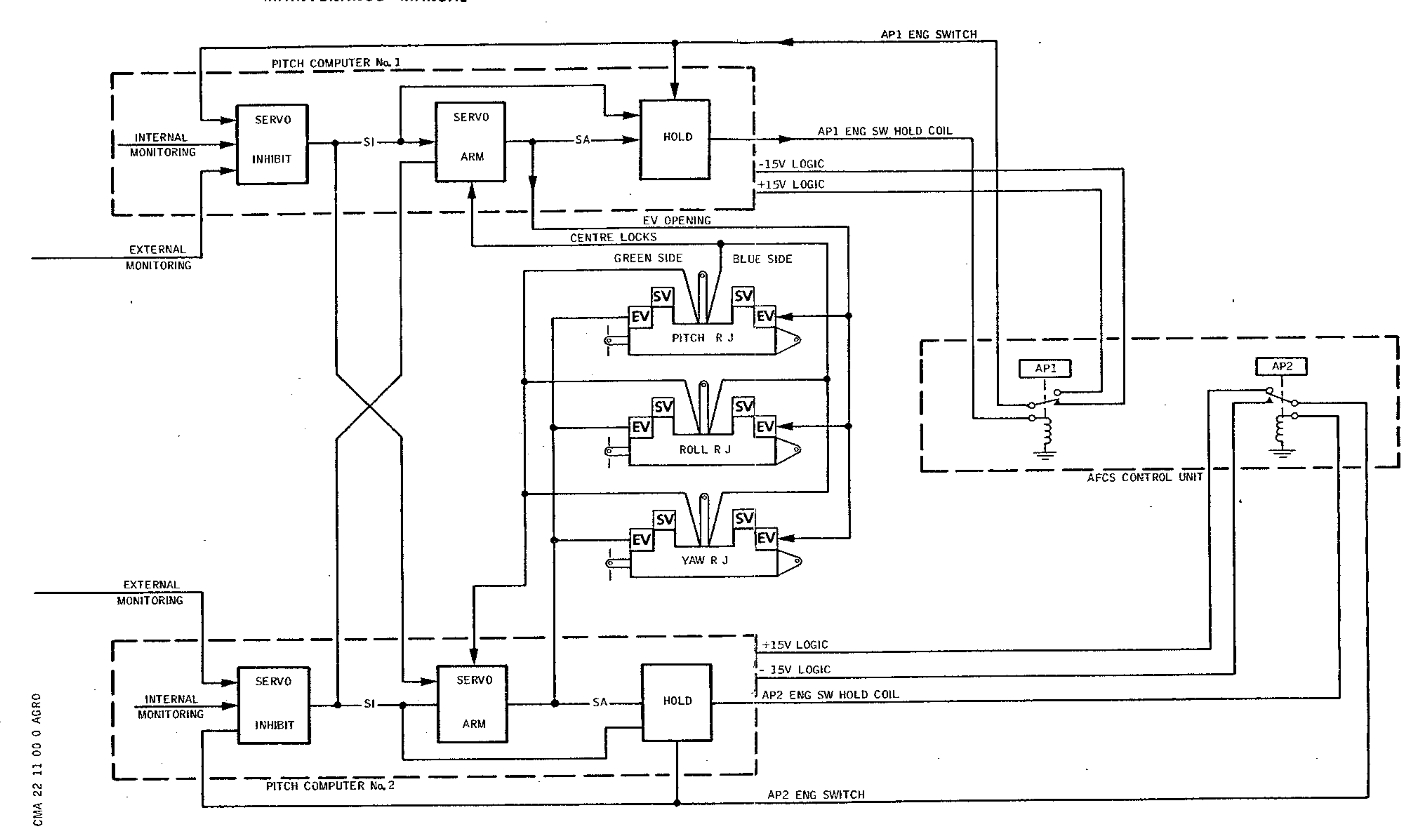
(4) Note :

The SI signal generated when one AP engages is also sent to the other AP which then disengages if it was previously engaged (one AP only engaged in cruise flight).
During approach, when LAND mode has been selected the SI signals are overridden and the 2 APs can be engaged in this mode simultaneously (AP2 is in standby and AP1 is in control).

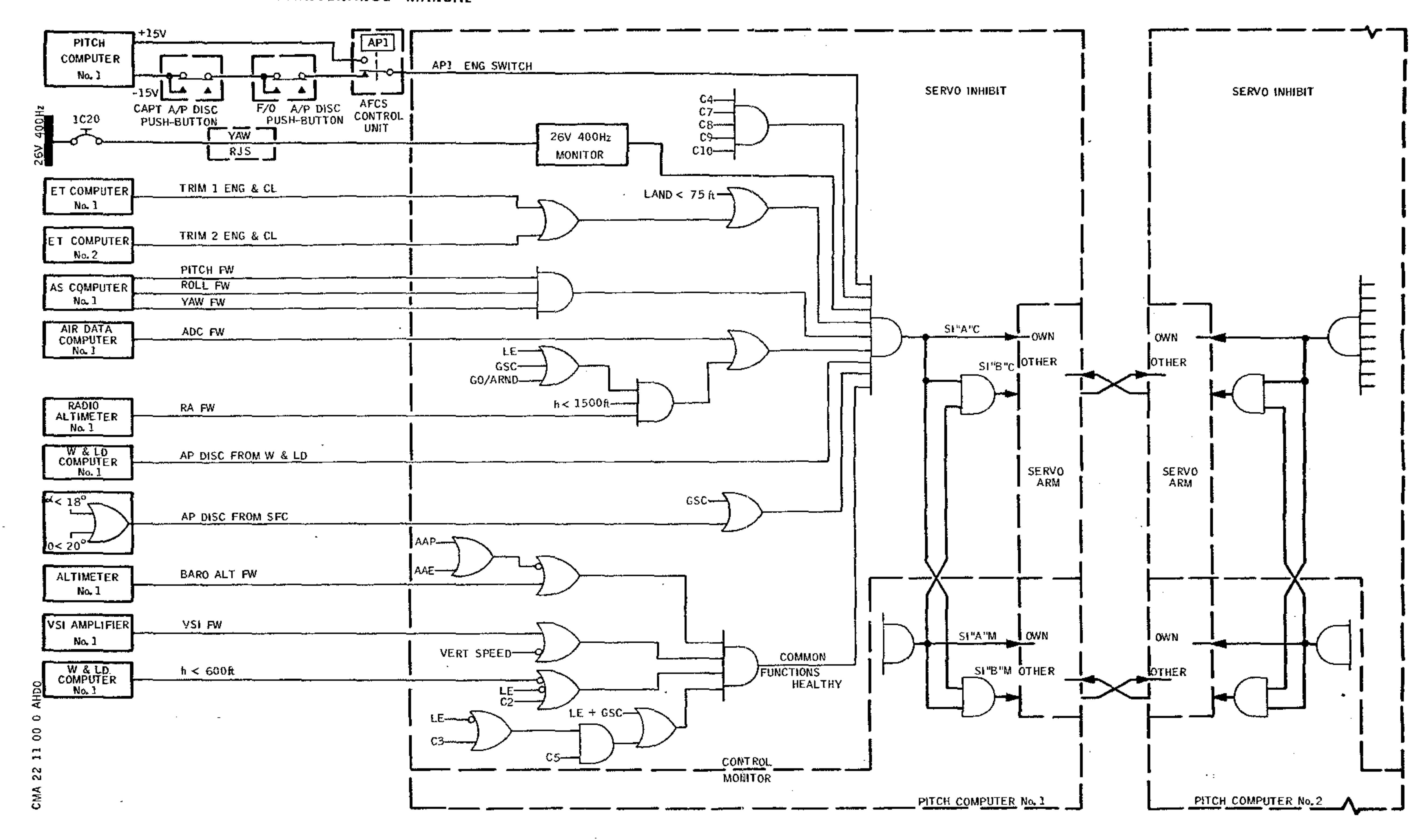
B. SERVO INHIBIT Signal
(Ref. Fig. 006)

The SI signal is generated if the following conditions are met :

(1) Selection of an AP engage switch



Principle of Engagement of One AP
Figure 005



Servo Inhibit Logic
Figure 006

The -15V logic signal corresponding to the engaged status generated in the power supply of the associated pitch computer passes through the rest position contacts of the AP disconnect (A/P DISC) push-buttons (Ref. paragraph 6).

(2) Internal monitoring healthy

(a) C4, C7, C8, C9 and C10 comparators healthy

These are operational throughout the flight :

- C4 monitors the outer loop integrator
- C7 monitors the pitch rate signal
- C8 monitors Mach information
- C9 monitors pitch relay jack position
- C10 monitors the orders sent to the pitch relay jack.

(3) External monitoring healthy

(a) 26V/400 Hz supply healthy

Monitoring of yaw relay jack sensor (RJS) connection.

(b) One electric trim (1 or 2) engaged and clutched.

This condition is inhibited at a height of less than 75 ft. in automatic landing.

(c) Three autostabilization axes engaged (same side).

(d) No ADC failure (same side)

This condition is inhibited when an approach mode (LAND, GLIDE or GO AROUND) is engaged, and the altitude displayed on the radio altimeter is less than 1500 ft.

(e) No disconnection order coming from safety flight control (SFC) computer

The disconnection order is generated when the angle of attack is greater than 18° or pitch angle is greater than 20°.
This disconnection order is inhibited after GLIDE mode capture.

(f) No disconnection order from the warning and lan-

ding display (W & LD) computer

The W & LD computer sends a disconnection order to the autopilot in the following configurations :

(f1) In cruise flight :

Inertial navigation system (INS) fault, self-detected or detected by inertial signals comparator unit (ISCU) cruise comparison.

(f2) In approach :

INS fault, self-detected or detected by 1SCU approach comparison.
Radio altimeter fault.
Instrument landing system (ILS) receiver fault.

NOTE : All disconnection configurations are described in detail in 22-41-00, Description and Operation, paragraph 5.C.(10).

(g) COMMON FUNCTIONS HEALTHY signal

This takes into account, depending on the pitch mode engaged, correct operation of peripheral equipment or of comparators associated with this mode :

(g1) ALT ACQ MODE, altimeter healthy.

(g2) VERT SPEED mode, vertical speed amplifier healthy.

(g3) LAND mode and altitude less than 600 ft., C2 comparator healthy

This comparator monitors the vertical speed for GLIDE EXTENSION and FLARE phases.

(g4) LAND or GLIDE mode, C5 comparator

This comparator monitors the pitch rate signal ordered.

(g5) LAND or GLIDE mode, C3 comparator healthy down to a height of 100 ft.

This comparator monitors the pitch attitude signal.

(4) Note :

In effect four SI signals are generated. Two are produced by the control logic and two others by the monitoring logic.
They are distributed as follows :
The control SI "A" signal is fed to the control channel SA gate, same side.
The control SI "B" signal is fed to the control channel SA gate, other side.
The monitoring SI "A" signal is fed to the monitoring channel SA gate, same side.
The monitoring SI "B" signal is fed to the monitoring channel SA gate, other side.

The SI "B" signal is also fed to the pitch computer for return to HDG HOLD basic mode (Ref. paragraph 4.C.(1)(b)(b5)).

C. SERVO ARM Signal
(Ref. Fig. 007)

The two SA signals (control and monitoring) are generated when the following conditions are present :

(1) Own SI signal and AZIMUTH AP HEALTHY signal present.

(a) SI signal already described.

(b) AZIMUTH AP HEALTHY signal (Ref. Fig. 008)

This signal is generated in the azimuth computer if the following conditions are met :

(b1) 26V/400 Hz supply healthy

(b2) AZIMUTH MODES INTERLOCKS signal healthy

This takes into account correct operation of peripheral equipment or comparators associated with the azimuth mode engaged (Ref. paragraph 5.C.).

(b3) No compass coupler fault

(b4) AP INNER LOOP INTERLOCKS signal healthy

For this the following conditions are necessary :

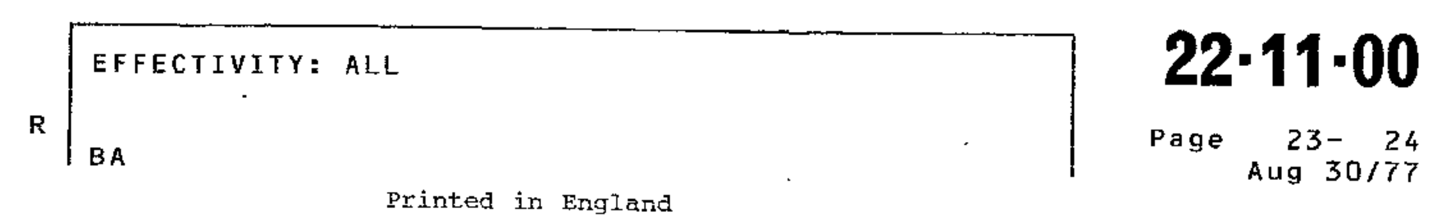
- C5, C6, C9 and C10 comparators healthy.

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AZ COMP No. 1
AZ AP HEALTHY C
INS DISC
CAPT AP DISC PUSH-BUTTON
FIRST OFF AP DISC PUSH-BUTTON
NOSE UP
DATUM ADJUST OFF
NOSE DOWN
PITCH COMP No. 1 -15V +15V
AFCS DATUM ADJUST UNIT
PITCH COMP No. 2
OTHER S I C
OTHER S I M
AZ AP HEALTHY M
PITCH
ROLL
YAW
AP FORCE LIMITER
SERVO ARM
OWN SI C
SYNC LEVEL
CL
ELP
CONTROL MONITOR
OWN SI M
LOAD LIMIT
LAND < 75 ft
GA
PITCH COMP No. 1
+28V
AP1
AFCS CONTROL UNIT
HOLD
OWN SAC
OWN SAM
CONTROL MONITOR
RELAY JACK
BLUE ELECTRO VALVES
LOCK
UNLOCK
GREEN ELECTRO VALVES
AZ COMP No. 2
DATUM ADJUST OFF
CL1
200ms
AP2
EXTENDED
COMPRESSED
LAND < 100 ft
PITCH COMP No. 2

CMA 22 11 00 0 AHMO

Servo Arm Logic
Figure 007


EFFECTIVITY: ALL
R
BA
Printed in England

CMA 22 11 00 0 AHRO

26V 400Hz MONITOR
AZ MODES INTERLOCKS
COMPASS COUPLER
COMPASS COUPLER FW
C5
C6
C9
C10
C2
C4
C12
LAND PHASE
AP INNER 2
AZ AP HEALTHY C
OWN AP ENG & HEALTHY
LOC TRK
PITCH COMP No. 1
G11
GSC & LOC TRK
GP OR GSC
AP PRE-ENG CONDITIONS
SERVO ARM
C
M
LOGIC
+15V
-15V
HDG HOLD
LAND PHASE
TURN CONTROL DETENT
CONTROL MONITOR
PITCH COMP NO. 1
AFCS DATUM ADJUST UNIT
TURN
AZ AP HEALTHY M
AZIMUTH COMP No. 1

AZIMUTH AP HEALTHY Logic
Figure 008


R EFFECTIVITY: ALL

BA

These are operative throughout the flight.
C5 monitors the roll inner loop
C6 monitors the input to the roll relay jack
C9 monitors the input to the yaw relay jack
C10 monitors the yaw inner loop.

- C2 and C4 comparators healthy in LOC TRK phase and C12 comparator healthy in LOC TRK phase, in LAND mode.

- C11 comparator healthy in GSC (glide slope capture) and LOC TRK phase.

(b5) AP PRE-ENGAGE CONDITIONS signal healthy

The AP/FD azimuth computer must normally be in HDG HOLD basic mode, with the TURN knob of the datum adjust unit in its neutral position (This condition is met when no AP/FD is engaged or as soon as an SI signal is generated on engagement of one AP).
These two conditions are overridden on selection or effective engagement of an approach mode, GLIDE or LAND.

(2) No AP disconnect push-button pressed.

(3) Before effective engagement :

(a) The three relay jack input levers must not be locked.

(b) The AP output order to the pitch relay jack basic loop must be less than 0.5°. This is monitored by a level detector (Ref. 22-12-00, Description and Operation, paragraph 3.G.(2)(c)).

(c) The NOSE UP - NOSE DOWN switch on the datum adjust unit must be in neutral position.

(4) SI signal for other AP not present

This condition is overridden for the PA1 SA signal as soon as LAND mode is selected.

(5) AP force limiters not compressed

This condition is overridden in automatic landing below a height of 75 ft. or in GO AROUND mode.

The control and monitoring SA signals thus produced open the corresponding electrovalves. These admit pressure to the associated servovalves and lock the input levers on the relay jack bodies.
The SA signal is then held by the CENTRE LOCKS (CL) and HOLD signals (see below).

AP switching in cruise flight is carried out as follows : The SI signal produced on engagement of the second AP causes loss of the SA signal of the first AP and thus loss of supply to its engage switch self-holding coil and loss of its SI signal.
At this moment the SA signal for the second AP is produced, thus supplying the engage switch self-holding coil. The second AP is then engaged.

During approach the SA signal for AP1 has priority. The AP2 SI signal is inhibited by the enter land phase (ELP) signal (produced as soon as land mode is selected.

D. HOLD Signal (Ref. Fig. 009)

(1) The AP F/W validity signal (-15V) is generated if the following conditions are present :

(a) Same channel SI signal and AZIMUTH AP HEALTHY signal (described above) present.

(b) The three input levers on the relay jack bodies locked.

(c) SA signal present or LAND mode selected or engaged (ELP signal present).

(d) COMMON FUNCTIONS HEALTHY signal and, when GO AROUND mode is engaged, C3 and C5 comparators healthy.

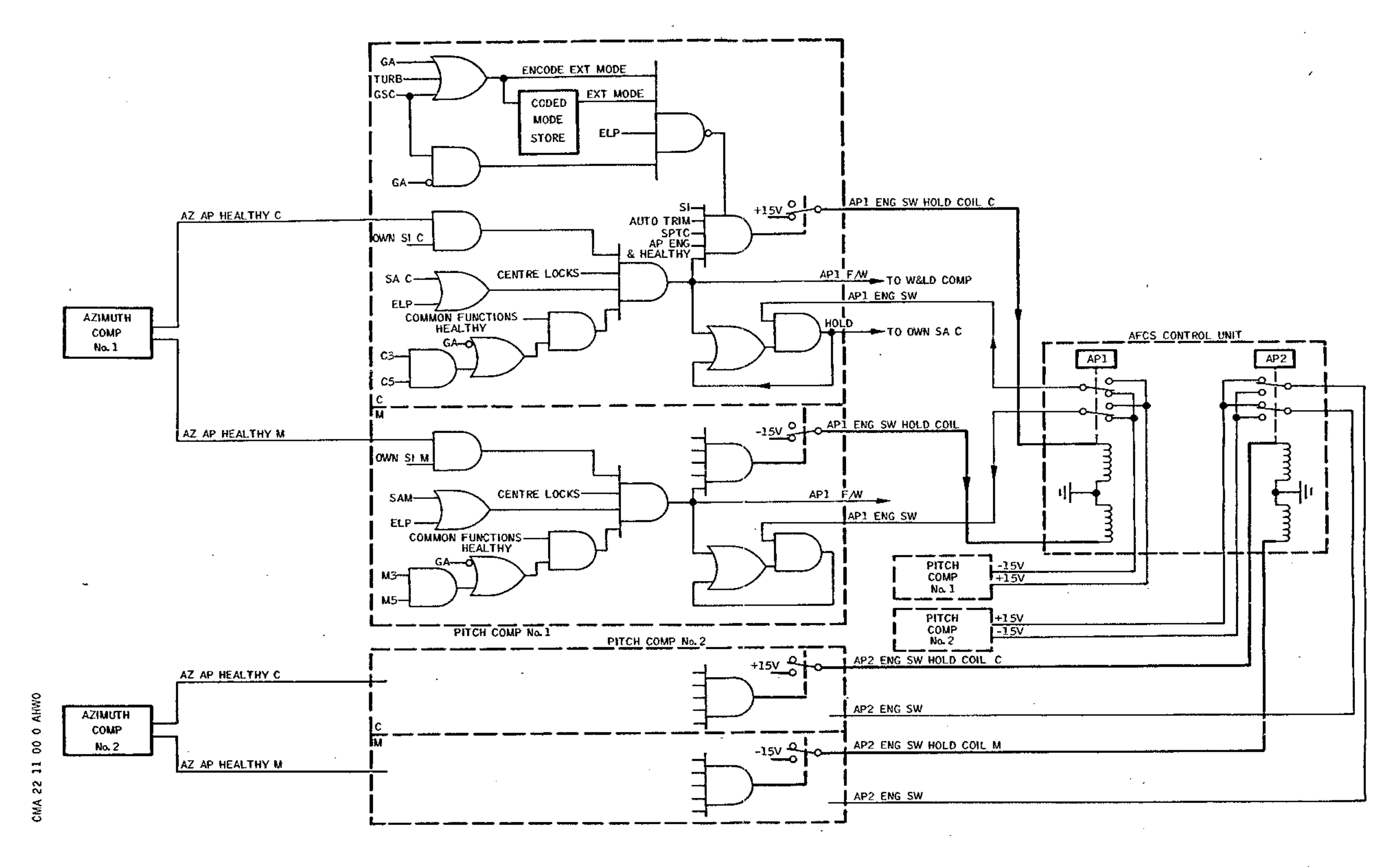
(d1) COMMON FUNCTIONS HEALTHY signal is described above (Ref. Paragraph 4.B.(3) (g)).

(d2) C3 monitors pitch attitude information. C5 monitors commanded pitch rate.

(2) The AP ENG SW HOLD COIL signal is generated (+15V for control logic, -15V for monitoring logic) if the following conditions are present :

(a) AP F/W signal healthy.

INTENTIONALLY BLANK



HOLD Logic
Figure 009

(b) All logic consolidated points healthy.

(c) No loss of EXTERNAL MODE signal on GLIDE capture during automatic approach in LAND mode.

This condition is inhibited if an automatic GO AROUND is triggered.

This signal supplies the engage switch self-holding coils.

(3) The AP F/W signal and engage switch selection produce the HOLD signal used by the SA logic.

5. FD Engage Logic
(Ref. Fig. 010)

The FD engage logic circuits are located in the azimuth computers. These circuits are paired (control and monitoring). When a FD is engaged an FD ENG SW signal is applied at input S of the flip-flop. This signal is generated by the AFCS control unit (the +15V and -15V signals correspond to the 0 and 1 logic states coming from the pitch computers).
The flip-flop changes state if the six inputs to the AND gate are validated.

A. Input (1)

TURB mode not engaged (this mode exists in AP only).

B. Input (2), PITCH FD HEALTHY Signal (Ref. Fig. 011)

This signal, generated in the AP/FD pitch computer, goes to logic state 1 (-15V) when the following conditions are met :

(1) COMMON FUNCTIONS HEALTHY signal present (Ref. AP Engage Logic, paragraph 4.B.(3)(g)).

(2) No disconnection order from the W & LD computer (Ref. AP Engage Logic, paragraph 4.B.(3)(f)).

(3) Three autostabilization axes engaged (same side) and pitch comparators C7 and C8 healthy. These conditions are overridden when GO AROUND mode is engaged.

(4) Pitch computer 26V/400 Hz supply healthy.

Yaw RJS connection monitored.

(5) No ADC failure (same side)

This condition is inhibited when an approach mode (LAND GLIDE or GO AROUND) is engaged, and the altitude displayed on the radio altimeter is less than 1500 ft.

(6) Pitch comparator C11 healthy when ALT ACQ, GLIDE or GO AROUND mode is engaged

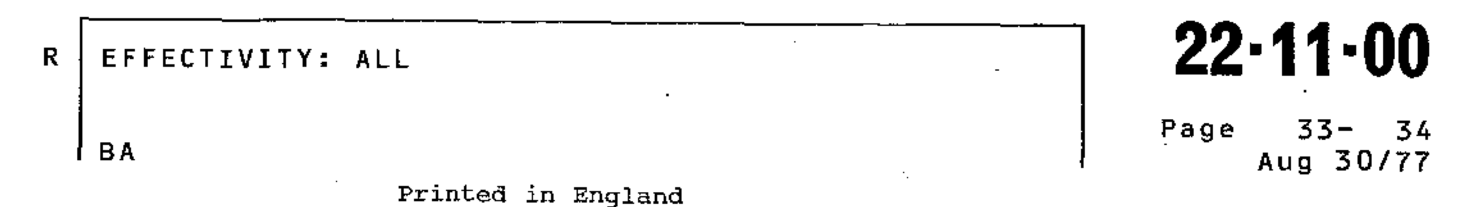
C11 monitors the orders sent to the ADI pitch bar.

C. Input (3)

AZIMUTH MODES INTERLOCKS signal healthy, or in RUNWAY GUIDANCE phase.

CONTROL
FDI ENG SW
FD1 F/W TO W & LD COMP
FD1 ENG SW HOLD COIL
+15V
FD1 ENG TO PITCH COMP AND AT COMP
S Q
R
TURB
PITCH COMP No. 1
PITCH FD HEALTHY C
AZ MODES INTER LOCKS
HDG/TRK
TRACK HEADING UNIT
HSI COMPASS FLAG
FDI FLAG
FD2 FLAG
LOC TRK
BACK BEAM
INS
ILS RECEIVER No. 1
RAD
W & LD COMPUTER
LOC RX FW
INS
RUNWAY GUIDANCE C7
INS COMP No. 1
HSI FW
C1 GO AROUND
C3
LOC-TRK
C8
LAND PHASE
GO/AROUND
LOC FREQ SELECT
LAND PHASE
FD ENGAGEMENT AND WARNING LOGIC
26V 400Hz MONITORING
COMPASS COUPLER No. 1
COMPASS COUPLER FW
MONITOR
FD1 ENG SW
-15V
FD1 ENG SW HOLD COIL
PITCH COMP No. 1
PITCH FD HEALTHY M
LOC RX FW
AZIMUTH COMPUTER No. 1
FD1
FD2
CAPT FD1/FD2 SWITCHING UNIT
CAPT FD1/FD2 SW
ADI 1
F/O FD1/FD2 SWITCHING UNIT
F/O FD1/FD2 SW
ADI 2
FD
AFCS CONTROL UNIT
FD1
FD2
PITCH COMP No. 1
-15V
+15V
PITCH COMP No. 2
+15V
-15V
CONTROL
+15V
FD2 ENG SW HOLD COIL
MONITOR
FD2 ENG SW
-15V
AZIMUTH COMPUTER No. 2
CMA 22 11 00 0 AJC0

Engage Logic of One FD
Figure 010



CMA 22 11 00 0 AJF0

W & LD COMP No. 1
AP DISC FROM W&LD
COMMON FUNCTIONS HEALTHY
AS COMP No. 1
PITCH FW
ROLL FW
YAW FW
GO AROUND
C7
C8
1C20
YAW RJS
26V 400Hz MONITOR
PITCH FD HEALTHY C
AIR DATA COMP 1
ADC FW
LE
GSC
GO AROUND
h < 1500ft
RADIO ALTI METER No. 1
RA FW
AZ COMP No. 1
GO AROUND
AAE
GSC
EXT MODE
C11
CONTROL
MONITOR
C FD ENGAGE
M LOGIC
AZIMUTH COMP No. 1
PITCH FD HEALTHY M
PITCH COMP No. 1

PITCH FD HEALTHY Logic
Figure 011


EFFECTIVITY: ALL
R
BA

The AZIMUTH MODES INTERLOCKS signal takes into account correct operation of peripheral equipment or comparators linked to the azimuth mode engaged.

(1) HDG/TRK mode, HSI COMPASS FLAG signal healthy (logic signal generated in track heading unit) (Ref. 22-10-00, Description and Operation, paragraph 3.G.).

(2) BACK BEAM mode, LOC RX F/W signal healthy (LOC receiver validity signal). This signal passes through the RAD/INS switch and the W & LD computer.

(3) INS mode, HSI F/W signal healthy (Ref. 22-10-00, Description and Operation, Paragraph 3.C.).

(4) LAND mode selected or engaged (LAND phase) and LOC frequency selected on VOR/ILS/DME control unit.

(5) C1 and C3 comparator healthy when in LOC TRK phase (in LOC or LAND mode).
C1 is inhibited on engagement of GO AROUND mode.
C1 monitors the LOC BEAM ERROR signal.
C3 monitors the roll signal generated by the outer loop of the LOC or LAND mode.

D. Input (4)

C7 comparator healthy in LOC TRK phase or C7 and C8 comparators healthy in LOC TRK phase in LAND mode.
C7 is inhibited in RUNWAY GUIDANCE phase.
C8 is inhibited in GO AROUND mode
C7 monitors FD roll control
C8 monitors FD yaw control

E. Input (5)

No compass coupler failure

F. Input (6)

26V/400Hz supply healthy
Monitoring of yaw RJS connection

NOTE : These 6 inputs correspond to the FD FLAG logic signal (0V equals logic state 1, 28V equals logic state 0).
This signal controls the FD flag on the ADI selected through the FD1/FD2 switches.
This signal does not depend on FD engagement, so healthy FD logic can be checked on the ADI (flag not visible).
If the FD logic is healthy and its engage switch is

selected three signals are generated :
FD ENG SW HOLD COIL (+15V control logic, -15V monitoting logic) which supplies the engage switch self-holding coils.
FD ENG, which is fed to the pitch computer (for its return to basic mode logic) and to the autothrottle computer (for its AP/FD and AT speed modes incompatability logic).
FD F/W, which is fed to the W & LD computer (for its LAND 2 and LAND 3 capacity logic).

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6. AP Instinctive Disconnect

A. Description

Each pilot has an AP instinctive disconnect push-button. These push-buttons are located on the LH side of the Captain control handwheel and on the RH side of the First Officer control handwheel.

B. Operation (Ref. Fig. 012)

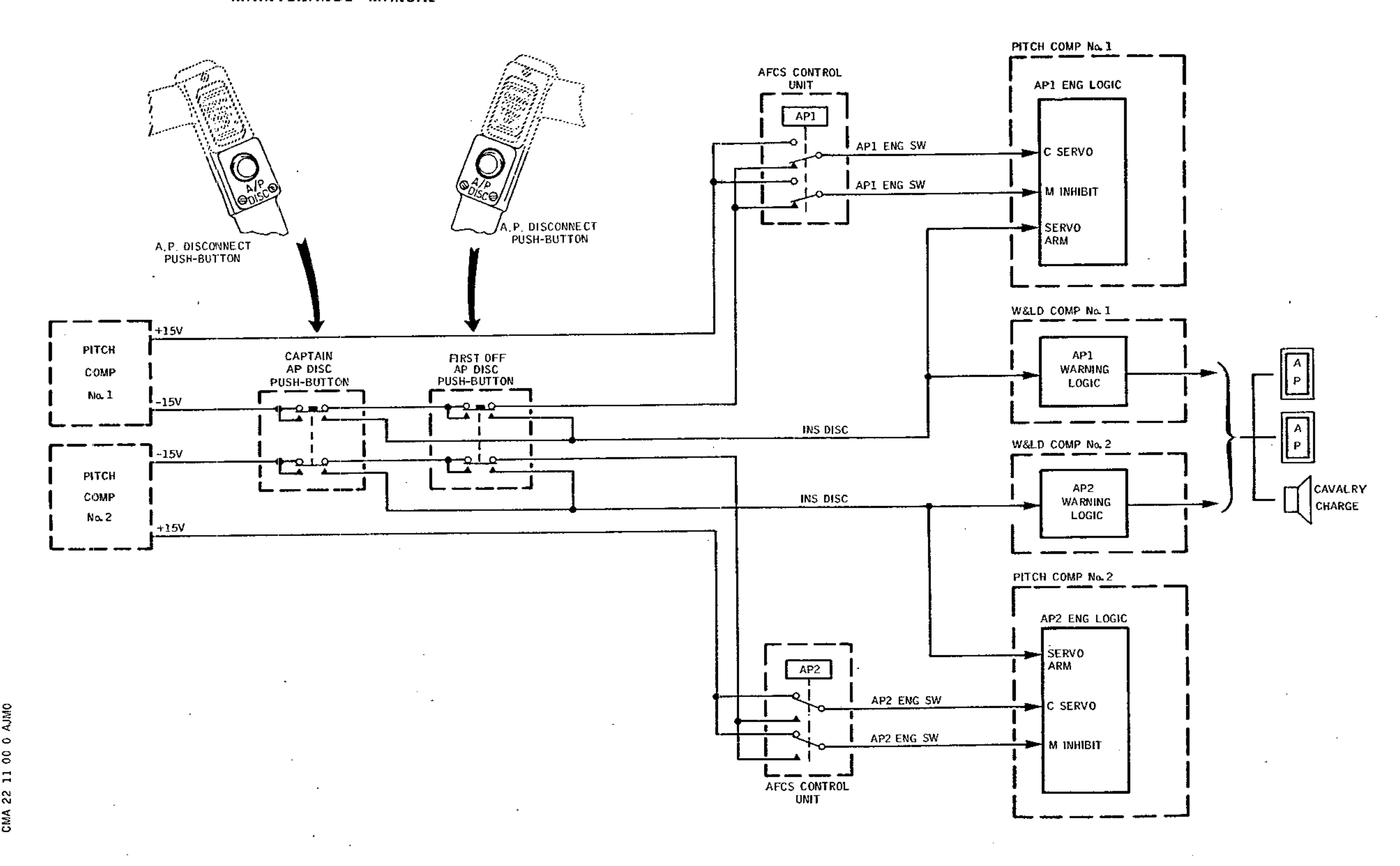
Each push-button acts on two microswitches, one of which is associated with AP1, while the other is associated with AP2

When one of the push-buttons is pressed once

- the AP previously engaged (or the two APs in approach) disconnects.
  The SERVO ARM signal of the AP engage logic is lost (Ref. Paragraph 4.C.)
- corresponding warnings are triggered. The red AP warning lights on the two W & LD indicators illuminate and the cavalry charge aural warning sounds for one second (Ref. 22-41-00, Description and Operation, Paragraph 5.C. (2)).

When the push-button is pressed again the visual warnings are cancelled (Ref. 22-41-00, Description and Operation, Paragraph 5.C. (2)).

NOTE : The -15V AP ENG SW signal corresponding to the engaged status generated in the pitch computer passes through the normally closed contacts of the AP disconnect push-buttons.



Instinctive Disconnect Circuit
Figure 012

7. AP Force Limiter

A. Description (Ref. Fig. 002)

A load limiting rod is installed between each relay jack and the artificial feel, allowing the authority of the AP to be limited. These rods are located in zone 121 (access door 121FB).

B. Operation (Ref. Fig. 007)

This rod is compressed if the AP order is too great acting on microswitches which disconnect the AP engaged.
This LOAD LIMIT signal is fed into the AP engaged logic at the SERVO ARM level (Ref. Paragraph 4.C.). The disconnection order is overridden in automatic landing below a height of 75 ft. or in GO AROUND mode.

The thresholds of the load limiting rods at flight control level are as follows :
Control column : 14.5 daN
Control handwheel : 9.6 daN
Rudder pedals : 30 daN

8. +15V and -15V Logic Signals Generation
(Ref. Fig. 013)

A. General

Each AP/FD pitch and azimuth computer has an integral power supply which generates the voltages necessary for operation of its analog circuits and peripheral equipment, in particular the +15V and -15V logic signals.

B. Monitoring

A comparator in the power supply of the azimuth computer monitors the -15V generated by the azimuth computer power supply and the -15V generated by the pitch computer power supply. When a fault is detected the comparator causes the -15V to be cut in the azimuth computer and the 115V/400Hz to be cut in the pitch computer.

C. Supply of Peripheral Equipment

The +15V and -15V signals supply the following equipment.

(1) The landing gear microswitches which inhibit :

(a) in the AP pitch computer, the flare test on the ground.

(b) in the ITEM, the TEST function in flight and the In Flight Monitor (IFM) function on the ground.

(2) The AFCS control unit.

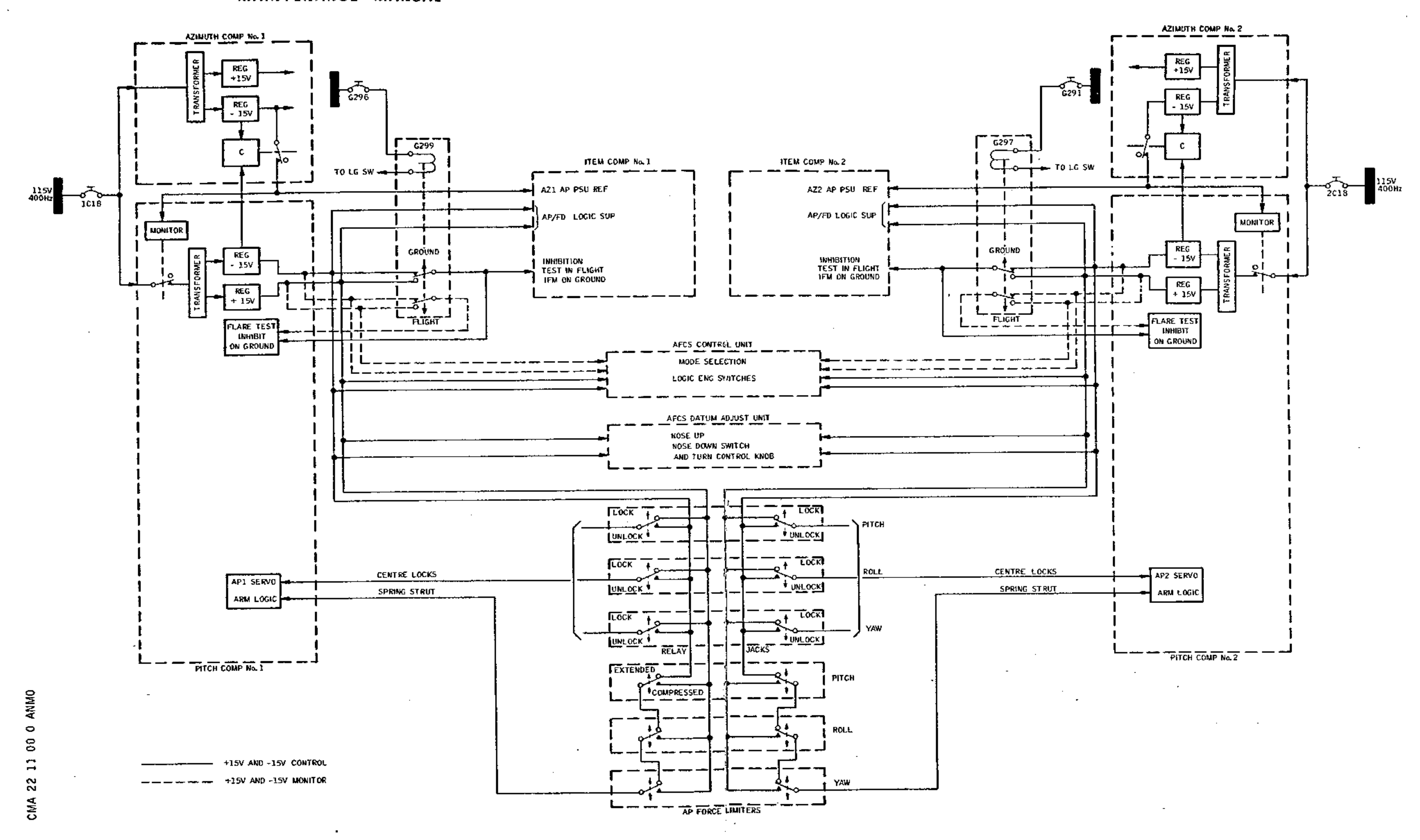
The +15V and -15V signals are used for engagement and disengagement of the AP and FD engage switches (Ref. Paragraphs 4 and 5).
The -15V signal only is used for mode selection.

(3) AFCS datum adjust unit.

The +15V and -15V signals are used for the different positions of the NOSE UP-NOSE DOWN switch associated with the AP pitch computer (Ref. Paragraph 3.B.). These signals are also used to signal the turned or neutral position of the TURN knob. The corresponding DETENT TURN CONTROL signal affects the AP engage logic (Ref. Paragraph 4.D.).

(4) Relay jack input lever locking microswitches

These signal the unlocked or locked status of the input



Monitoring and Distribution of +15V and -15V
Logic Signals
Figure 013

levers on the relay jack bodies ; the CENTRE LOCKS signal is used in the AP engagement SERVO ARM logic (Ref. paragraph 4.C).

(5) AP force limiters.

The compressed or extended status of each load limiting rod is signalled by the status of the load limiting rod microswitches. The LOAD LIMIT signal is processed by the AP engagement SERVO ARM logic (Ref. Paragraphs 4.C. and 7.).

9. Altitude Alert System (Ref. Fig. 014)

A. General

(1) The altitude alert system indicates approach to or deviation from a selected altitude to the pilots. Operation of this system is independent of AP or FD engagement, except on change of altitude in ALT ACQ mode.

(2) Two altitude alert sub-systems are normally installed on the aircraft. Sub-system 1 is located in AP/FD pitch computer No.1 and sub-system 2 is located in AP/FD pitch computer No.2.

(3) The system provides aural and/or visual warnings allowing approach to the selected altitude and deviation from this altitude, as well as the magnitude of the deviation, to be distinguished.
The aural warning (650 Hz) lasts for two seconds.
The visual warning is provided by two amber warning lights, which can be steadily illuminated or flashing, depending on the configuration. These warning lights are located on the Captain and First Officer altimeters.

(4) The warnings triggered when the aircraft deviates from a selected altitude are inhibited on landing gear extension. However, the system can be made to operate on the ground for maintenance.

(5) The system is neutralized during rotation of the ALTITUDE SELECT rotary switch on the AFCS control unit.

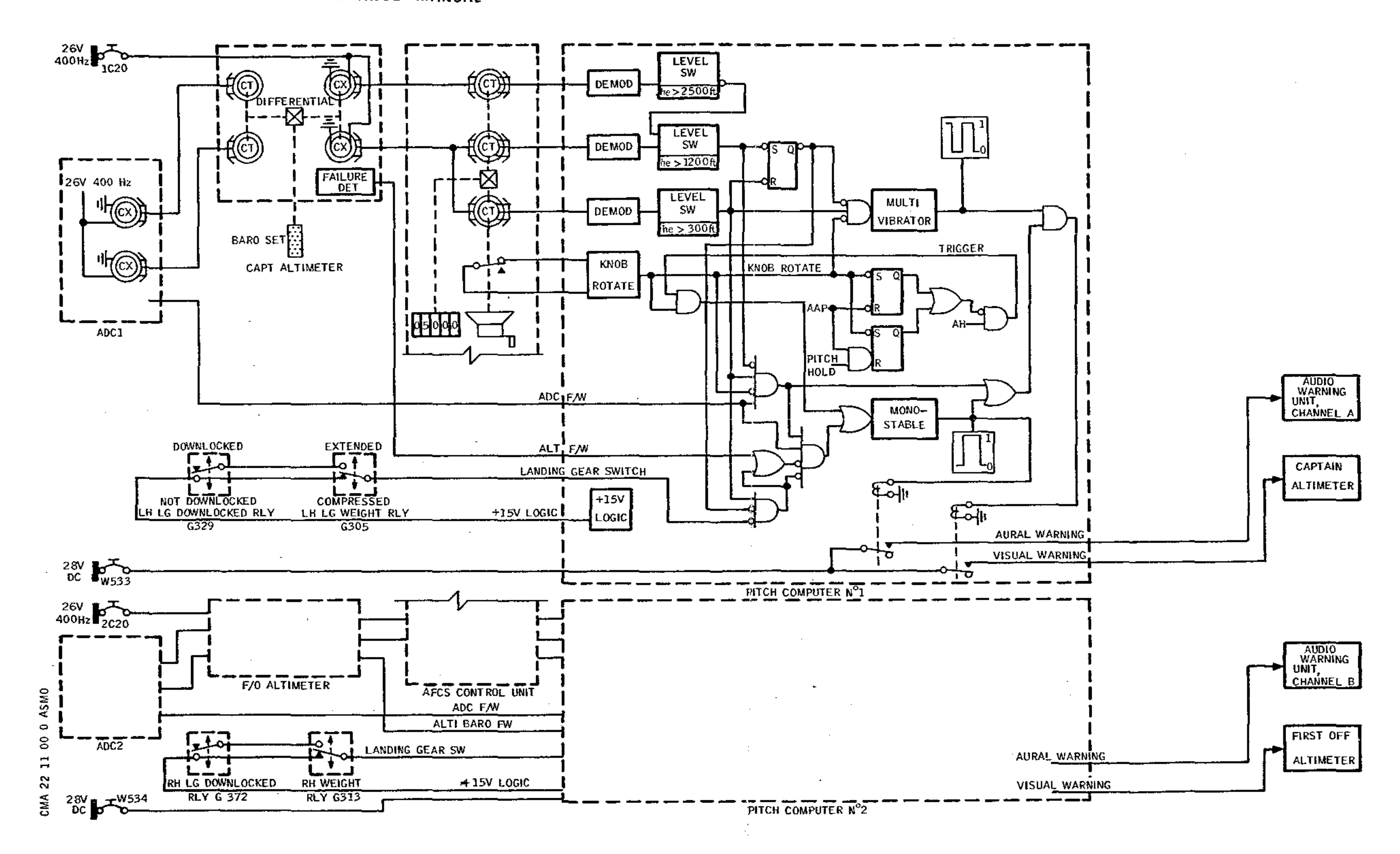
(6) Not applicable.

B. Operation (Ref. Fig. 015)

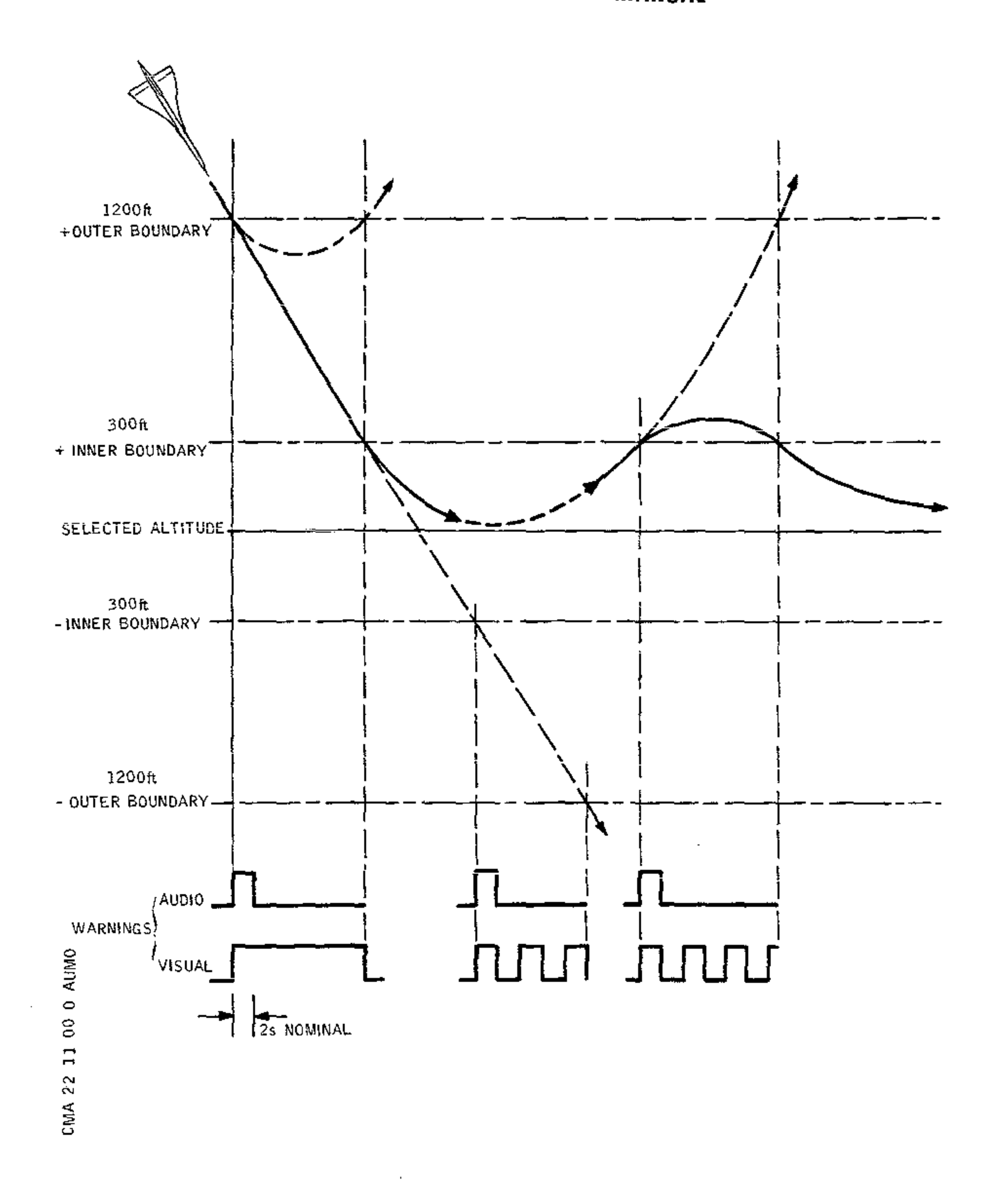
The warnings are triggered at one of two boundaries. These boundaries are computed using signals from the ALTITUDE SELECT rotary switch on the AFCS control unit. The inner boundary is set at 300 ft. and the outer boundary at 1200 ft.

(1) Approach to selected altitude

When the aircraft reaches the outer boundary the aural warning sounds for approximately two seconds. The warning lights on the Captain and First Officer altimeters come on and remain on until the aircraft reaches the inner boundary.



Altitude Alert Circuit
Figure 014



Operation Sequence
Figure 015

(2) Deviation from selected altitude

If the aircraft deviates from the altitude to be held, the aural warning sounds for two seconds when it reaches the inner boundary. The warning lights flash until the aircraft reaches the outer boundary.

(3) Compatibility with ALT ACQ mode

The altitude alert system operates normally with the AP/FD ALT ACQ mode.
Though this system does not depend on AP/FD engagement, the warnings are triggered and last for approximately two seconds in the following case :
When the pilot selects a new altitude, with the AP/FD ALT ACQ mode engaged, the mode logic causes the AP/FD to change to PITCH HOLD mode, with ALT ACQ primed.
As soon as the aircraft altitude minus selected altitude (h aircraft - h selected) term becomes zero, and then changes sign, the mode logic causes the AP/FD to change to ALT HOLD mode. At that moment the warnings are triggered to inform the pilot that the altitude held by the AP/FD is not the same as that displayed on the ALTITUDE SELECT counter on the AFCS control unit.

AFCS DATUM ADJUST UNIT - REMOVAL/INSTALLATION

1. General

WARNING : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

The AFCS datum adjust unit (C2) is mounted in zone 7-211, in the centre console forward section.

2. AFCS Datum Adjust Unit

A. Equipment and Materials

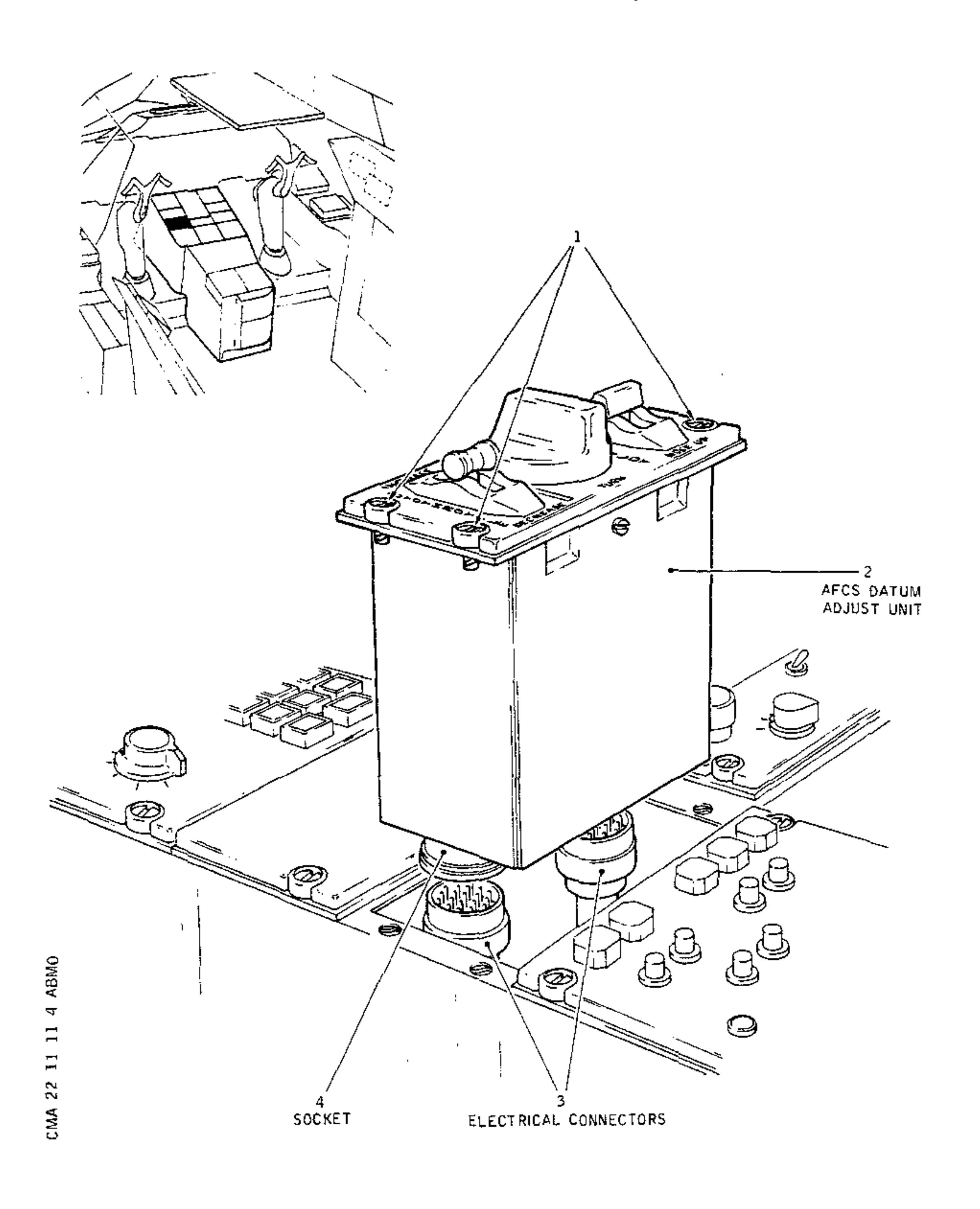
DESCRIPTION	PART NO.
Access Platform 4.440 m (14 ft. 8 in.)	
Electrical Connector Blanking Caps	
Circuit Breaker Safety Clips	

B. Prepare

(1) Trip, safety, and tag the following circuit breakers.

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AP/FD SYS 1 CONT	1-213	1C 17	Q13
AP/FD SYS 1 SUP	2-213	1C 20	C 5
AP/FD SYS 2 CONT	5-213	2C 17	A11
AP/FD COMP 1 SUP	13-215	1C 18	A 5
		1C 179	C 6
AP/FD SYS 2 SUP	13-216	2C 20	A17
AT SYS 2 SUP		2C 179	D16
AP/FD COMP 2 SUP		2C 18	B 8
CTR CONSOLE INST LTS SUP	14-216	L 405	B 8

C. Remove



AFCS Datum Adjust Unit Installation
Figure 401

R (1) Release the four quarter-turn (dzus) fasteners (1).

(2) Withdraw AFCS datum adjust unit (2) from its recess.

(3) Disconnect electrical connectors (3) from both sockets (4) A and B.

(4) Remove AFCS datum adjust unit (2).

D. Preparation of Replacement Component

(1) Visually check AFCS datum adjust unit for evidence of corrosion, nicks and dents.

E. Install

(1) Connect both electrical connectors (3) to both sockets (4) A and B.

(2) Push AFCS datum adjust unit (2) fully home.

(3) Tighten the four quarter-turn (dzus) fasteners (1).

(4) Remove safety clips and tags and reset the circuit breakers previously tripped.

F. Test

R (1) Ref. 22-11-11, Adjustment/Test.

G. Close-Up

(1) Remove access platform.

AFCS DATUM ADJUST UNIT - ADJUSTMENT/TEST

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

1. General

CAUTION : OBSERVE THE GENERAL SAFETY PRECAUTIONS IN (22-00-00, SERVICING).

In this test, the three AFCS datum adjust unit control switches are check with both Autopilots and both autothrottle systems.

NOTE : For NOSE UP - NOSE DOWN control switch, only the first position (slow variation rate) is checked in both directions.

2. Operational Test

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.47 meters (14 ft. 8 in.)	

R B. Prepare

R B WARNING : DO NOT ENGAGE AN AUTOPILOT WHEN THE AIRCRAFT
R B IS ON JACKS

(1) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG 2	1-213	2E 461	E 3
ENG 3		3E 461	E 4
AT 1 CONT		1C 180	Q12
AFCS 1 CONT		1C 19	Q14
AFCS 2 CONT	5-213	2C 19	A12
AT 2 CONT		2C 180	A14
ENG 1		1E 461	D 1
ENG 4		4E 461	D 2
AT SYS 1 SUP	13-215	1C 179	C 6
AT SYNCHRO SYS 1 SUP		1C 181	D 5
AT SYNCHRO SYS 2 SUP	13-216	2C 181	B17
AT SYS 2 SUP		2C 179	D16

(2) Energize the aircraft electrical network and connect electrical ground power unit (Ref. 24-41-00, Servicing)

(3) At Flight Engineer's station, on EQUIPMENT BAY COOLING panel, make certain that the electronics rack ventilation operates (Ref. 21-21-00).

(4) Operate flight control system in blue or green electrical mode (Ref. 27-00-00, Servicing).

(5) Carry out the work preparation required for the engagement of both APs' (Ref. 22=10=00, Servicing).

(6) Align the four throttle control levers in mid-way position and, on ceiling panel, make certain that, on AUTOTHROTTLE control unit the four isolation switches are in ON position.

C. Tests

(1) On AFCS control unit, engage AP1 switch.

(a) This switch remains engaged.

(b) PITCH HOLD and HDG HOLD pushbuttons illuminate.

(c) The AP1 indicator light illuminates.

(d) Check that there is no noticeable displacement of the control column.

(2) On AFCS datum adjust unit, press AUTOPILOT control switch, in the NOSE UP direction (slow variation rate : 1st position).

(a) The trim handwheel rotates in the nose-up direction

(b) The control column moves backwards.

(c) The elevons deflect upwards (check on the ICOVOL indicator).

(3) On datum adjust unit, press AUTOPILOT control switch in the NOSE DOWN direction (slow variation rate, 1st position).

(a) The trim handwheel rotates in the nose-down direction.

(b) The control column moves forwards.

(c) The elevons deflect downwards.

(4) On datum adjust unit, rotate TURN knob clockwise :

(a) The control column wheel rotates to the right.

(b) The elevons deflect as for a right turn (Check on the ICOVOL indicator).

(5) Rotate TURN knob clockwise.

(a) The control column rotates to the left.

(b) The elevons deflect as for a left turn.

(6) Set TURN control back to neutral and disengage AP 1 switch by means of AP DISC switch (Captain or First Officer's control handwheel).

(7) Depress INS DISC push-button once again to cancel warnings.

(8) Engage AP 2 switch and repeat test for NOSE UP NOSE

DOWN and TURN knobs.

- The results obtained must be the same as for AP No.1.

(9) On AFCS control unit, engage AT1 switch.

(a) The switch remains engaged.

(b) The IAS HOLD pushbutton illuminates.

(10) On datum adjust unit, move AUTOTHROTTLE toggle switch in the INCREASE direction.

(a) The four throttle control levers move towards the Maximum Thrust positions.

(11) Move AUTOTHROTTLE toggle switch in the DECREASE direction.

(a) The four throttle control levers move towards the idle positions.

(12) Disengage AT1 switch and press AT red warning light on either warning and landing display indicator (Captain's or First Officer's).

(13) Engage AT2 switch and repeat AUTOTHROTTLE control test.

(a) The results must be the same as those obtained for Autothrottle No.1.

(14) Disengage AP2 and AT2 switches and cancel warnings.

D. Close-Up

(1) Carry out close-up required for the engagement of both AP's (Ref. 22-10-00, Servicing).

(2) De-energize the aircraft electrical network, and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

AFCS CONTROL UNIT - REMOVAL/INSTALLATION

1. General

CAUTION : OBSERVE THE SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

The automatic flight control system (AFCS) control unit C1 is located in the flight compartment glareshield.

2. AFCS Control Unit

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.470 m (14 ft. 8 in.)	
Circuit Breaker Safety Clips	

B. Prepare

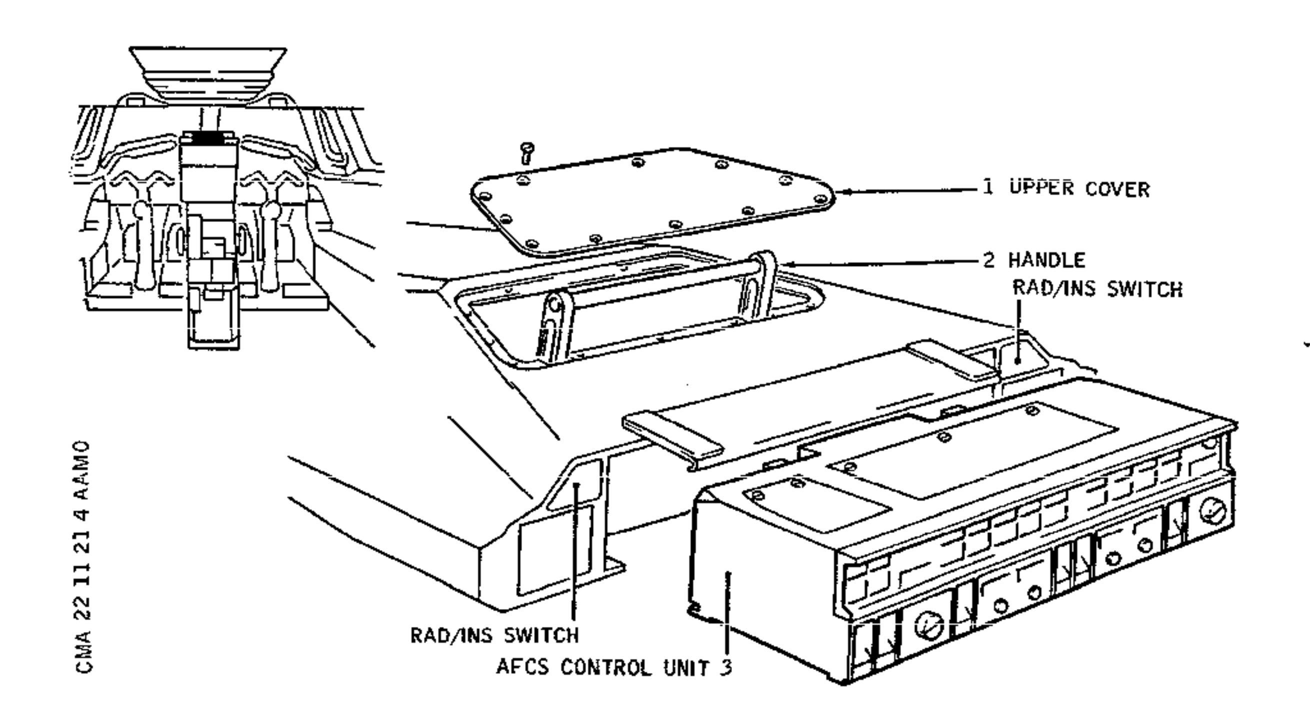
(1) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
COMPASS COUPLER SYS1 SW SUP	1-213	1F 134	F14
RAD/INS 1ST PILOT SW SUP		1F 26	G17
AFCS1 CONT		1C 19	Q14
AP/FD SYS1 SUP	2-213	1C 20	C 5
COMPASS COUPLER1 SUP		1F 130	F 8
VOR-VHF NAV1 SUP		1R 33	G 7
AFCS2 CONT	5-213	2C 19	A12
AP/FD COMP1 SUP	13-215	1C 18	A 5
AFCS MODE SYS1 LTS SUP		1C 273	B 5
COMPASS COUPLER 2 STBY		2F 131	B 7
AT SYS1 SUP		1C 179	C 6
AT SYNCHRO SYS1 SUP		1C 181	D 5
AP/FD SYS2 SUP	13-216	2C 20	A17
AT SYNCHRO SYS2 SUP		2C 181	B17
COMPASS COUPLER 2 NORM		2F 130	D15

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
SUP			
AT SYS2 SUP		2C 179	D16
VOR VHF NAV2 SUP		2R 33	E14
AFCS MODE SYST2 LTS SUP		2C 273	E17
AP/FD COMP2 SUP		2C 18	F18
COMPASS COUPLER SYS2 SUP	15-216	2F 134	A21
RAD/INS 2ND PLT SW SUP		2F 26	E21

(2) On panel 5-211, place the two RAD/INS switches, (on both sides of the AFCS control unit) in RAD position.

C. Remove



- Control Unit Removal
Figure 401

(1) Remove upper cover (1) attachment screws.

(2) Remove upper cover (1).

(3) Pull handle (2) upwards in order to unlatch.

(a) AFCS control unit locking pawls must open.

(4) Remove AFCS control unit (3).

CAUTION : THE CONTROL UNIT WEIGHS 9.3 KGS (20.5 LB.)

D. Preparation of Replacement Component

(1) Make certain that control unit is in correct condition and that the electrical connections and various controls (engage switches, selectors, mode selection push-buttons) are not damaged.

E. Install

(1) Check that handle (2) is raised.

(2) Insert control unit (3) into its recess.

(3) Lower handle (2).

(a) The control unit must be firmly seated and locked in its recess.

(4) Install upper cover (1).

(5) Tighten upper cover (1) attachment screws.

(6) Remove safety clips and tags and reset the circuit breakers previously tripped.

F. Tests

(Ref. 22-11-21, Adjustment/Test).

G. Close-Up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2) Remove access platform.

AFCS CONTROL UNIT - ADJUSTMENT/TEST

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

1. General

WARNING : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

2. Functional Test

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.47 metres (14 ft. 8in.)	

R B. Prepare

R B WARNING : DO NOT ENGAGE AN AUTOPILOT WHEN THE AIRCRAFT
R B IS ON JACKS.

(1) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(2) At Flight Engineer's station, on EQUIPMENT BAY COOLING section, make certain that electronics rack ventila-

tion is in operation. (Ref. 21-21-00).

(3) Set flight controls in Blue or Green electrical mode (Ref. 27-00-00, Servicing).

(4) Carry out work preparation required for engagement of both APs. (Ref. 22-10-00, Servicing).

C. Tests

(1) On AFCS control unit, engage FD1 and FD2 switches.

(a) Both switches must remain engaged.

(b) PITCH HOLD mode selection push-button must illuminate.

(2) Engage AP2 switch.

(a) Switch must remain engaged.

(b) HDG HOLD mode selection push-button must illuminate.

(3) Engage AP1 switch.

(a) Switch must remain engaged.

(b) AP2 switch must disengage.

(4) Successively select MACH HOLD, IAS HOLD, ALT HOLD, VERT SPEED, TRK/HDG and MAX CLIMB modes.

(a) Each time a mode is selected, check that associated mode selection push-button illuminates and that previously illuminated mode selection push-button extinguishes.

(5) Make certain that MAX CRUISE mode selection push-button does not illuminate on selection of MAX CLIMB mode.

(6) Not applicable

(7) Select INS mode.

(a) INS mode selection push-button must illuminate.

(b) HDG HOLD push-button must extinguish.

(8) On AFCS control unit, pull the two HDG-TRK push-pull knobs and display the heading read on both HSIS (zero

degree heading error) by means of these two knobs.

(9) Select HDG/TRK mode.

(a) HDG/TRK mode selection push-button must illuminate.

(b) INS mode selection push-button must extinguish.

(10) Slightly turn HDG-TRK 1 push-pull knob clockwise (increasing heading).

(a) The control column handwheel must rotate to the right.

(b) On Captain's HSI, the heading pointer must show the heading selected by means of the HDG-TRK 1 push-pull knob.

(11) On Course Deviation Indicator, set displayed heading to aircraft heading.

(12) Select VOR/LOC, ALT ACQ, GLIDE, then LAND modes.

(a) Check that each time a mode is selected, the associated prime indicator light illuminates.

(13) Select HDG HOLD and PITCH HOLD modes.

(a) VOR/LOC, ALT ACQ, GLIDE, and LAND prime indicator lights must extinguish.

(b) PITCH HOLD and HDG HOLD mode selection push-buttons must illuminate.

(14) Select TURB mode.

(a) FD1 and FD2 switches must disengage.

(b) TURB mode selection push-button must illuminate.

(c) PITCH HOLD and HDG HOLD mode selection push-buttons must extinguish.

(15) Press AP DISC switch on Captain's (First Officer's) control column to disengage AP1 switch.

(a) All AFCS control unit lights must extinguish.

(b) On Captain's and on First Officer's W & LD indicators, the red AP warning lights must illumi-

nate.

(c) The cavalry charge aural warning must sound during 1 second.

(16) Press either AP warning light to cancel warnings.

(17) On AFCS control unit, engage AT1 and AT2 switches.

(a) Both switches must remain engaged.

(b) IAS HOLD mode selection push-button must illuminate.

(18) On AUTHROTTLE section, select MACH HOLD mode.

(a) MACH HOLD mode push-button must illuminate.

(b) IAS HOLD mode selection push-button must extinguish.

(19) Select IAS ACQ mode.

(a) IAS ACQ mode selection push-button must illuminate.

(b) MACH HOLD mode selection push-button must extinguish.

(c) The throttle control levers move to idle positions.

(d) The bar located in SPEED SELECT window must disappear.

(20) On throttle control lever No.1 (or No.4) press AT instinctive disconnect push-button to disengage both AT switches.

(a) All AFCS control unit lights must extinguish.

(b) On Captain's and First Officer's W & LD indicators, AT red warning lights must flash.

(21) Press either AT warning light to cancel warnings.

D. Close-Up

(1) Carry out close-up required for the engagement of both AP's (Ref. 22-10-00, Servicing).

(2) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

AUTOPILOT INSTINCTIVE DISCONNECT SWITCH - REMOVAL/INSTALLATION

1. General

WARNING : OBSERVE THE ELECTRICAL SAFETY PRECAUTIONS DESCRIBED IN 24-00-00, SERVICING.

The instinctive disconnection of the autopilot is provided by means of four switches, fitted in the Captain control column handwheel LH arm or in the First Officer control column hand-wheel RH arm.
The two switches 1C14 and 2C14 are associated with the A/P DISC push-button located at Captain handwheel and the two switches 1C15 and 2C15 are associated with the A/P DISC push-button located at First Officer handwheel. These switches are activated by depressing the corresponding A/P DISC push-button.

The removal and installation procedure, being identical for each switch, will be described for one switch only.

2. Autopilot Instinctive Disconnect Switch
(Ref. Fig. 401)

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.440 m (14 ft. 8 in.)	
Circuit Breaker Safety Clips	
Special Product (Ref. 20-30-00, No.111)	
Special Product (Ref. 20-30-00, No.120)	

B. Prepare

(1) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AP/FD COMP 1 SUP	13-215	1C 18	A 5
AP/FD COMP 2 SUP	13-216	2C 18	F18

C. Remove

(1) Unscrew then remove the three attaching screws (1) from cover (2).
Remove cover (2).

(2) Remove hinge pin (4) in order to separate AP instinctive disconnect push-button (3) from support plate (6).

(3) Unscrew then remove the five attaching screws (a) from support plate (6).

(4) Depending on the length of wiring (of the switches) which can be pulled out, separate support plate (6) from control column handwheel.

(5) Hold support plate (6) to unscrew slotted round nut (5) of associated switch (8).

(6) Remove switch (8) from its recess.

(7) Slide protection sleeve (7) to reach the three lugs of switch (8).

(8) Identify the three wires (- 15VDC supply and the two interconnection wires) ; remove the switch lugs by means of a soldering iron.

(9) Remove switch (8).

D. Preparation of Replacement Component

(1) Check switch for correct condition

(2) Make certain that lugs are in good condition

(3) Make certain that the push-button moves freely and smoothly.

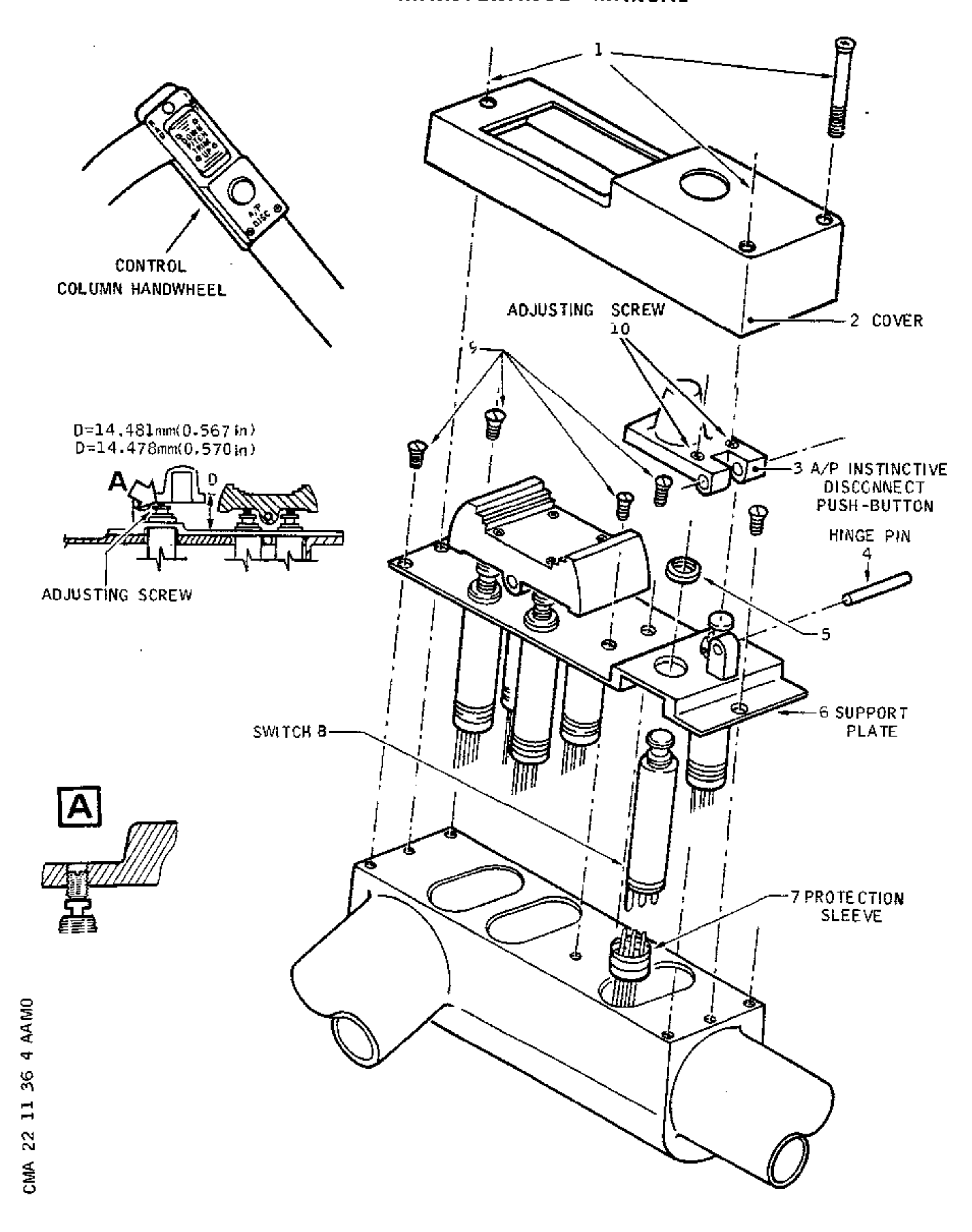
E. Install

(1) Note identification of the three wires, then connect them to the three switch (8) asssociated lugs by means of a soldering iron.

(2) Position protection sleeve (7).

(3) Introduce switch (8) into its recess.

(4) Install, screw and tighten slotted round nut (5).



AP Instinctive Disconnect Switch Installation
Figure 401

(5) Install instinctive disconnect push-button (3) ; install hinge pin (4) so that push-button (3) becomes integral with support plate.

(6) Check that the ends of the two adjusting screws (10), which protude from PITCH TRIM switch (3) inner face, come into contact with the push-buttons of the two switches without causing their displacement ; otherwise, set adjusting screw (10) as follows :

(a) Remove relevant adjusting screw(s) (10).

(b) Coat threads with Products No.111 and No.120

(c) Install adjusting screw(s) (10) on A/P instinctive disconnect push-button (3).

(d) Tighten until D dimension between the outer face of the push-button (3) base and support plate (6) is 14.401 mm to 14.478 mm (0.567 in. to 0.570 in.)

(7) Carefully slide switch wiring into control column handwheel until support plate (6) almost comes into contact with control column handwheel.

(8) Install suport plate (6) on control column handwheel and attach it by means of the five relevant attaching screws (9).

(9) Install cover (2) and attach it by means of the three relevant attaching screws (1).

(10) Remove safety clips and tags and reset the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AP/FD COMP 1 SUP	13-215	1C 18	A 5
AP/FD COMP 2 SUP	13-216	2C 18	F18

F. Test

(1) Engage successively AP No.1 and AP No.2 (Ref. 22-10-00, Adjustment/Test, Operational Test) then successively disconnect then by means of instinctive disconnect push-button.

G. Close-Up

(1) Remove access platform.

FD1/FD2 SWITCHING UNIT - REMOVAL/INSTALLATION

1. General

WARNING : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

The two FD1/FD2 switching units (1C25) and (2C25) are installed in the electronic racks, on shelves 4-215 and 4-216 respectively. Removal is described for one switching unit only, as the procedure is identical for both switching units.

2. FD1/FD2 Switching Unit

A. Equipment and Materials.

DESCRIPTION	PART NO.
Access Platform 4.47 metres (14 ft. 8 in.)	
Circuit Breaker Safety Clips	

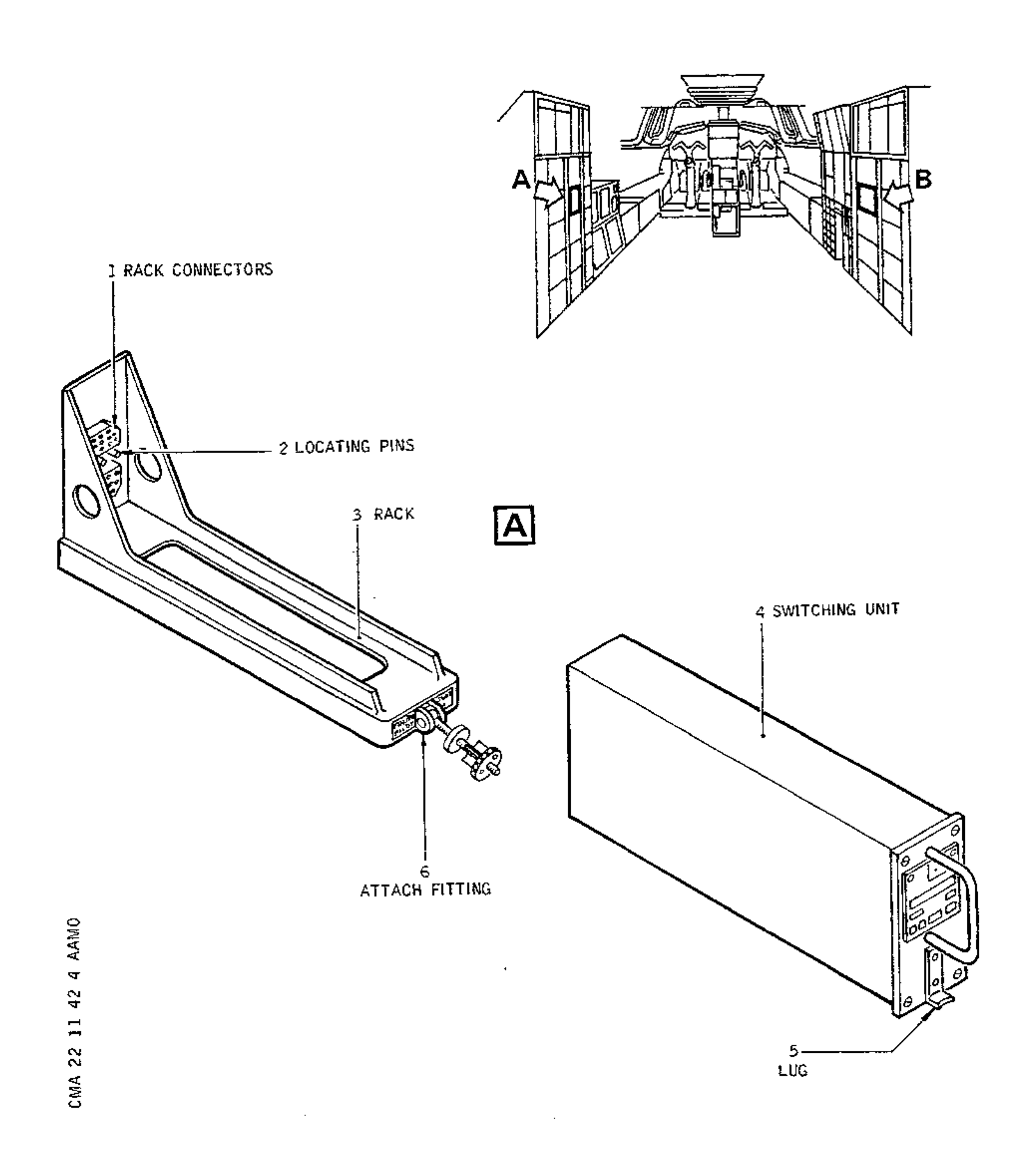
B. Prepare

(1) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FD1/FD2 1st PLT SW SUP	1-213	1C 27	Q15
LDG DISPLAY SYS 1 SUP	2-213	1C 191	F 4
FD1/FD2 2nd PLT SW SUP	5-213	2C 27	A13
AP/FD COMP 1 SUP	13-215	1C 18	A 5
LDG DISPLAY SYS 2 SUP	13-216	2C 191	F16
AD/FD COMP 2 SUP		2C 18	F18

(2) Remove panel 215BS (216BS) to gain access to shelf 4-215 (4-216).

C. Remove (Ref. Fig. 401)



FD1/FD2 Switching Unit Installation
Figure 401

NOTE : When switching unit is not replaced immediately after removal, rack ventilation holes should be blanked using appropriate blanking plugs/caps.

(1) Loosen retaining nut (6) of attach fitting until lug (5) in free.

(2) Pull gently on switching unit (4) handle so as to free switching unit from rack (3) connectors.

(3) Withdraw switching unit (4) from rack (3).

D. Preparation of Replacement Component

(1) Make certain that rack is clean and that connectors and locating pins are in good condition.

(2) Make certain that switching unit is undamaged and that connectors show no signs of oxidation.

E. Install

(1) Position switching unit (4) in rack (3) and slide towards rear of rack, making certain that locating pins (2) engage correctly in holes in rear of switching unit (4).

(2) Continue to push switching unit (4) so that male connector on switching unit and female connectors (1) on rack engage correctly.

(3) Position attach fitting retainer over lug (5) and tighten retaining nut (6).

(4) Remove safety clips and tags and reset circuit breakers previously tripped.

F. Test

Ref. Adjustment/Test

G. Close-Up

(1) Install panel 215BS (216BS).

(2) Remove access platform.

FD1/FD2 SWITCHING UNIT - ADJUSTMENT/TEST

1. General

WARNING : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

The following test is to be performed after removal of one the FD1/FD2 switching units.
The test is described separately for each switching unit ; the work preparation is common to both.
The FD1/FD2 switches on Captain's and First Officer's instrument panels are assumed to be in good operational condition.

2. Operational Test

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.47 metres R (14 ft. 8 in.)	

B. Prepare

(1) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(2) At Flight Engineer's station, on EQUIPMENT BAY COOLING panel, make certain that electronics rack ventilation is in operation.

(3) Carry out work preparation required for engagement of
R both FDs (Ref. 22-10-00, Servicing).

(4) On Captain's instrument panel place FD1/FD2 switch in FD1 position.

(5) On First Officer's instrument panel place FD1/FD2 switch in FD2 position.

(6) On both attitude director indicators (ADI's) check that red FD flag is not visible, and that FD1 annunciator is visible on Captain's ADI and FD2 annunciator is visible on First Officer's ADI.

C. Tests of Captain's FD1/FD2 Switching Unit (1C25)

R (1) On AFCS control unit, engage FD1 switch.

R (a) Switch must remain engaged.

R (b) PITCH HOLD push-button must illuminate.

R (c) Pitch bar must appear on Captain's ADI.

R (2) On Captain's instrument panel, place FD1/FD2 switch
R in FD2 position.

R (a) On Captain's ADI.

R (a1) FD2 annunciator must be visible.

R (a2) Pitch bar must disappear.

R (3) Engage FD2 switch.

R (a) Pitch bar must appear on Captain's ADI.

R (4) Place Captain's FD1/FD2 switch in FD1 position.

R (a) On Captain's ADI

R (a1) FD1 annunciator must be visible.

R (a2) Pitch bar must be visible.

R (5) Disengage FD1 and FD2 switches.

R D. Tests of First Officer's FD1/FD2 Switching Unit (2C25)

R (1) On AFCS control unit, engage FD2 switch.

R (a) Switch must remain engaged.

R (b) PITCH HOLD push-button must illuminate.

R (c) Pitch bar must appear on First Officer's ADI.

R (2) On First Officer's instrument panel, place FD1/FD2
R switch in FD1 position.

R (a) On First Officer's ADI

R (a1) FD1 annunciator must be visible.

R (a2) Pitch bar must disappear.

R (3) Engage FD1 switch.

R (a) Pitch bar must appear on First Officer's ADI.

R (4) Place First Officer's FD1/FD2 switch in FD2 position.

R (a) On First Officer's ADI

R (a1) FD2 annunciator must be visible.

R (a2) Pitch bar must be visible.

R (5) Disengage FD1 and FD2 switches.

R E. Close-Up

R (1) Carry out close-up for engagement of both FDs (Ref.
R 22-10-00, Servicing).

R (a) On both ADIs, the red FD flag must appear.

R (2) De-energize the aircraft electrical network and dis-
R connect electrical ground power unit (Ref. 24-41-00,
R Servicing).

PITCH CHANNEL - DESCRIPTION AND OPERATION

1. General
(Ref. Fig. 001, 002 and 003)

A. The pitch channel includes two separate monitored pitch channels operating into pitch relay jacks (RJ). Operation with only one pitch channel is possible, but if a fail operative capability is required, then the engagement of both channels is necessary. With both channels engaged, the second channel operates in a synchronizing mode, ready to assume control should the first channel fail. In cruise, only single channel operation is possible.

B. The pitch channel includes the following components :

(1) An AFCS control unit (common to both pitch channels). It is mounted on the glareshield, above the centre instrument panel, half-way between the two pilots.

It is provided with pitch mode selection push-buttons and an ALTITUDE SELECT knob.

(2) An AFCS datum adjust unit (common to both pitch channels).
This is mounted on the centre console, forward of the throttle control levers.

A NOSE UP - NOSE DOWN switch on this unit switch allows :

(a) Adjustment of aircraft attitude when PITCH HOLD basic mode is selected.

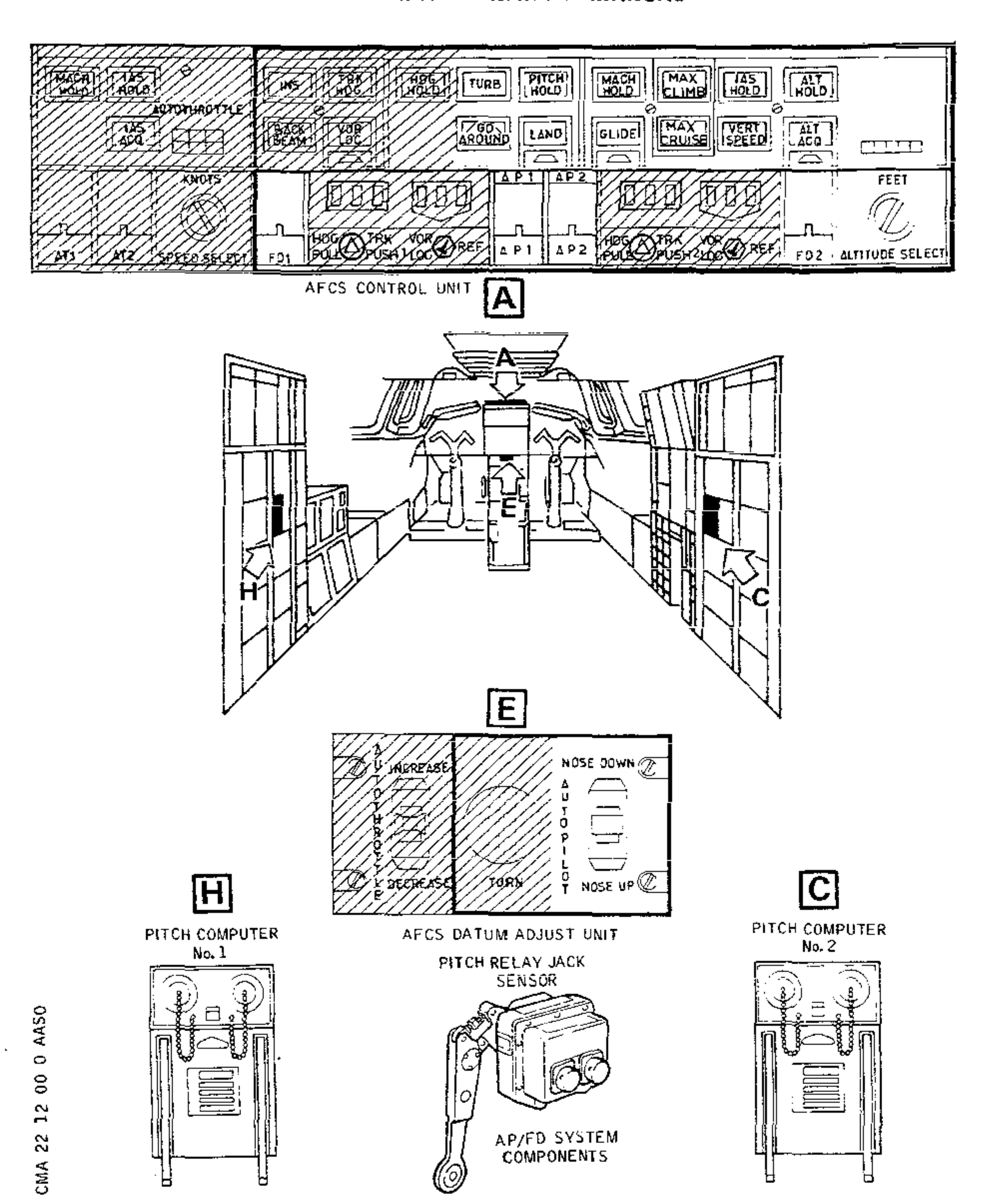
(b) Adjustment of the value to be maintained in the MACH HOLD, IAS HOLD, ALT HOLD and MAX CLIMB modes.

(c) Adjustment of the vertical speed to be maintained in VERT SPEED mode by controlling the speed displayed on the vertical speed Indicator (VSI) (Ref. 22-10-00, Description and Operation - Paragraph 3.L.).

NOTE : The ranges for these various adjustments are indicated when dealing with the associated mode operation.

(3) Two pitch computers (one for each pitch channel).

They are mounted on electronics rack shelves.



Pitch Channel Components
Figure 001

Computer No.1 is located on shelf 4-215, computer No.2 on shelf 4-216.

(4) A pitch relay jack sensor (RJS), which is common to both pitch channels. It is mounted on the Relay Jack chassis and its input lever is actuated by the pitch Relay Jack.

C. Various data sources provide the pitch channel with essential information used as references to ensure proper aircraft control about the pitch axis. These sources are :

(1) The Inertial Navigation System (INS)

Each INS sends the following signals to the associated pitch channel :

(a) Pitch attitude (PITCH ATTITUDE)

(b) Roll attitude (ROLL ATTITUDE)

(c) Vertical acceleration (VERT ACCEL)

(2) The Air Data Computer (ADC)

Each ADC sends the following output signals to the associated pitch channel :

(a) Mach number (MACH NUMBER)

(b) Mach holding error (MACH HOLD ERROR)

(c) Indicated air speed holding error (IAS HOLD ERROR)

(d) Reference cruising speed holding (IAS-VRC)

(e) Altitude holding error (ALT HOLD ERROR)

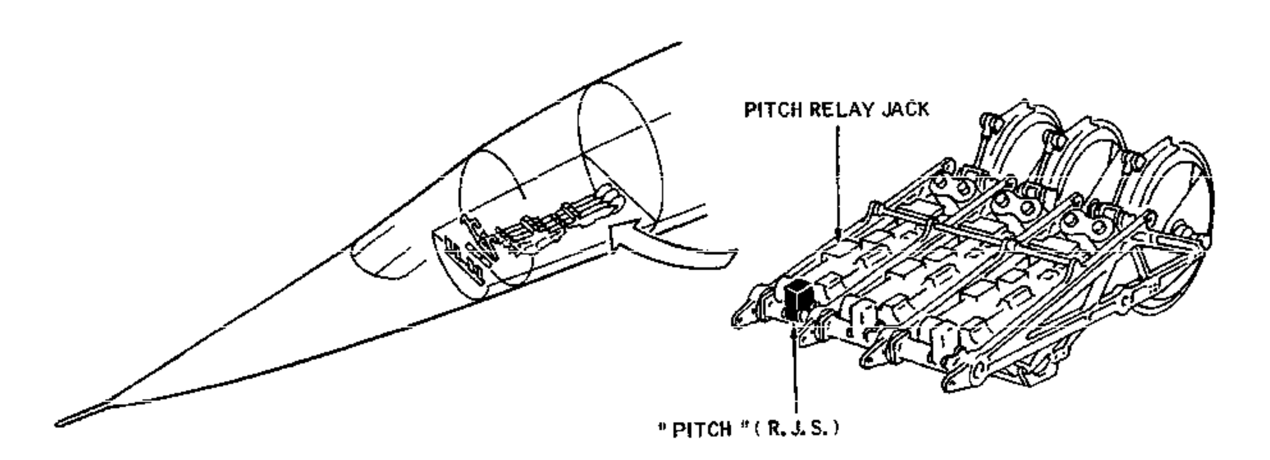
(f) Two altitude outputs (COARSE ALT - FINE ALT)

(g) Two vertical speed outputs (Vz1 - Vz2)

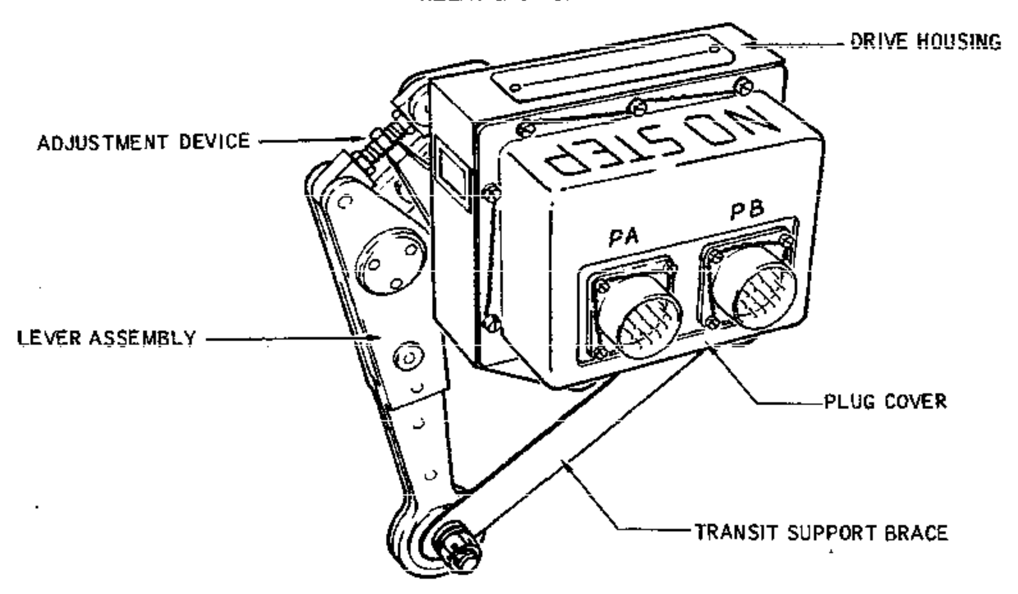
Each pitch computer transmits clutching signals from the synchros generating an error signal to the associated ADC.

(3) Autostabilization Computers

Each computer sends a pitch rate signal (PITCH RATE) to the associated pitch channel.

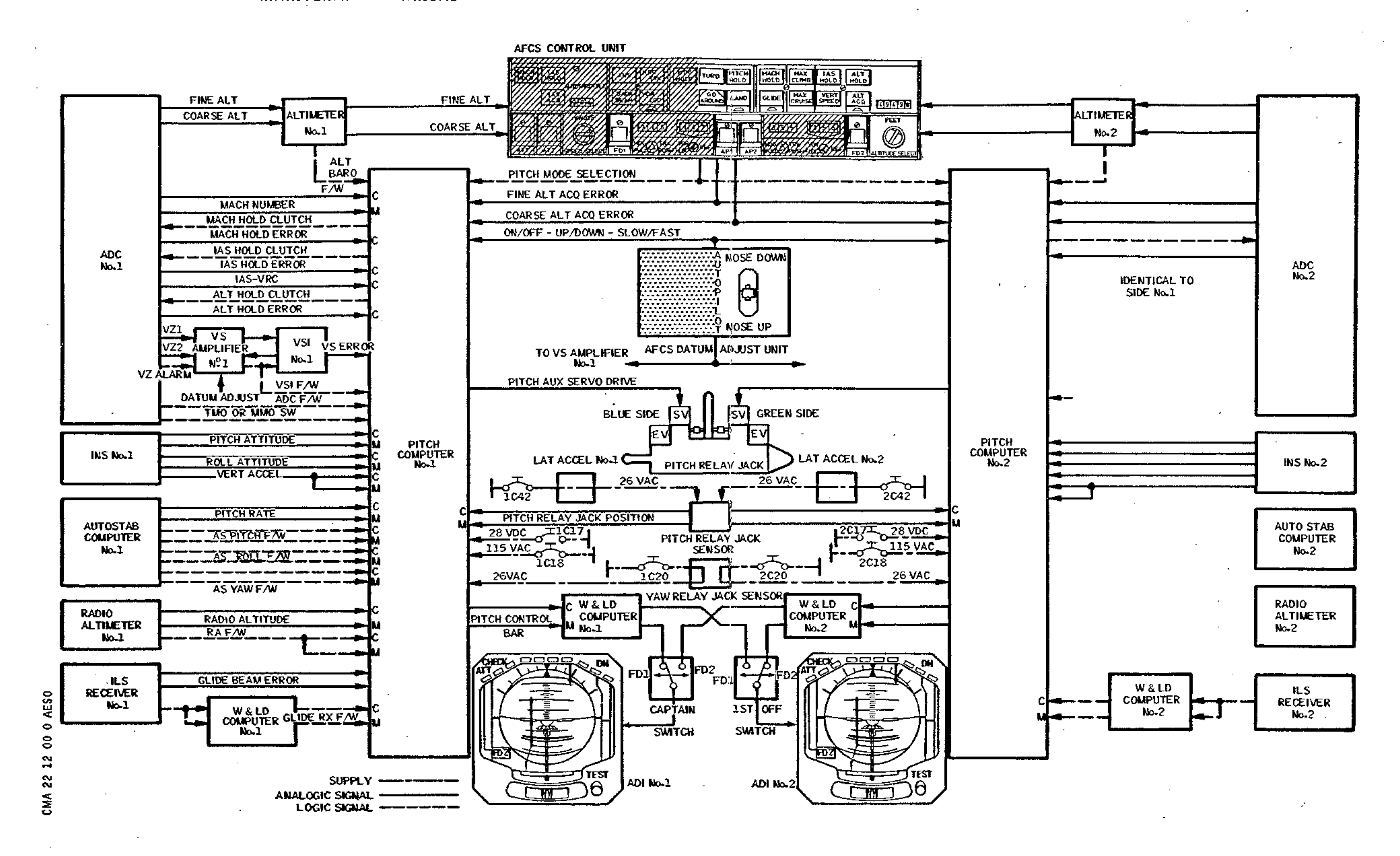






CMA 22 12 00 0 ACM0

Pitch Relay Jack Sensor Location
Figure 002



Pitch Channel Block Diagram
Figure 003

(4) Radio Altimeter

Each radio altimeter sends a radio altimeter signal (RADIO ALTITUDE) to the associated pitch channel.

(5) ILS Receiver

Each ILS receiver sends a Glide beam error signal (GLIDE BEAM ERROR) to the associated pitch channel.

(6) Vertical Speed Indicator (VSI)

Each VSI sends a vertical speed error signal (VERTICAL SPEED ERROR) to the associated pitch channel.

NOTE : The logic validity signals from the various equipment are shown in the block diagram.

D. The following analog signals are generated in each pitch computer

(1) When an AP is engaged, the associated computer sends a control signal (PITCH AUX SERVO DRIVE) to the servo valve associated with the pitch relay jack.

NOTE : During dual channel operation, in the approach and automatic landing configurations, pitch channel 1 is in control via the Blue SV of the pitch relay jack, pitch channel 2 being in synchronization. In the event of an automatic change-over due to pitch channel 1 disconnection then pitch channel 2 assumes control via the Green SV.

(2) When an FD is engaged, the associated computer issues a control signal (PITCH CONTROL BAR) to the associated Attitude Director Indicator (ADI) pitch control bar.

This signal can be cancelled at the output amplifier level by an internal computer logic signal (PITCH BAR REMOVAL) which is dealt with in paragraph 3.9).

NOTE : Both FDs may be engaged throughout the flight envelope and, as a rule, ADI 1 receives control orders from computer No.1 and ADI 2 receives control orders from computer No.2. However, the FD1/FD2 switches located on the Captain's and First Officer's instrument panels enable both ADIs to be connected to either computer.
The PITCH CONTROL BAR signal is fed through the

associated W & LD computer ; for some faults this computer causes the signal to be cut out and the ADI pitch control bar to be cancelled. This circuit is dealt with in 22-41-00, Description and Operation, Paragraph 5.C.(9).

(3) The pitch relay jack sensor transmits a control signal and a monitoring signal (PITCH RELAY JACK POSITION) to both computers. This servo feedback controls the Relay Jack displacement.

E. Each computer is supplied with 28 VDC, 115 VAC and 26 VAC through circuit breakers 1C17, 1C18 and 1C20 respectively.

NOTE : The 26 VAC supply through the yaw RJS enables the sensor connections to be checked.

F. The pitch RJS receives two 26VAC supplies (channel 1 and channel 2) through circuit breakers 1C42 and 2C42 respectively (autostabilization circuit breakers).

NOTE : These two 26 VAC supplies are transmitted via the autostabilization lateral accelerometers and enable the accelerometer connections to be checked.

2. Description of Common and Pitch Modes

A. Mode Selection and Engagement

The mode selection push-buttons are located on the AFCS control unit.
Mode selection is provided by pushing the associated push-button. This operation provides selection demand as well as cancellation of the previous mode after engagement of the new mode through the mode engage logic of the associated computers. Following this, the push-button illuminates (2 bulbs).

NOTE : The pitch mode logic circuits are incorporated in the pitch computers. They are dealt with in paragraph 5, at mode level.

The logic circuits of the common LAND and TURB modes as well as the circuits associated with the GO AROUND function are incorporated in the azimuth computers and are dealt with in 22-13-00, Description and Operation.

B. PITCH HOLD Mode

The PITCH HOLD mode is automatically selected on engagement of one AP or one FD channel.

Therefore, its engagement logic is similar to that of the AP and the FD.

On engagement of one AP and FD in PITCH HOLD mode, the ADI pitch control bar is cancelled.

When the AP/FD system is engaged in a speed mode on engagement of the autothrottle, the AP/FD logic ensures an automatic changeover to PITCH HOLD mode. If the TURB push-button is pressed, the AP reverts to the basic modes. The AP/FD system holds the aircraft attitude existing at the time of engagement of the mode.

The attitude maintained may be modified through operation of the NOSE UP/NOSE DOWN switch located on the AFCS datum adjust unit.

The aircraft attitude may be varied as desired according to the duration of this operation and irrespective of the aircraft speed. There are two load factor limits :

(1) 0.05 g, first position of switch (slow adjustment)

(2) 0.15 g, second position of switch (fast adjustment)

When this control switch is released, the AP/FD holds the existing attitude.

C. MACH HOLD Mode

The engagement logic of this mode is identical to that of the AP/FD system.

The ADC validity signal (ADC FAILURE WARNING) covers the failures detected in the air data system reference data associated with this mode.

The AP/FD system ensures holding of the Mach number existing at the time of selection. The MACH HOLD push-button then illuminates.

The MACH number value may be modified through operation of the AFCS datum adjust unit NOSE UP/NOSE DOWN switch. The adjustment range is ± 0.06 Mach with respect to the Mach number existing at the time of engagement, with the following rates :

(1) 0.002 Mach per second, first position of switch (slow adjustment).

(2) 0.007 Mach per second, second position of switch (fast adjustment).

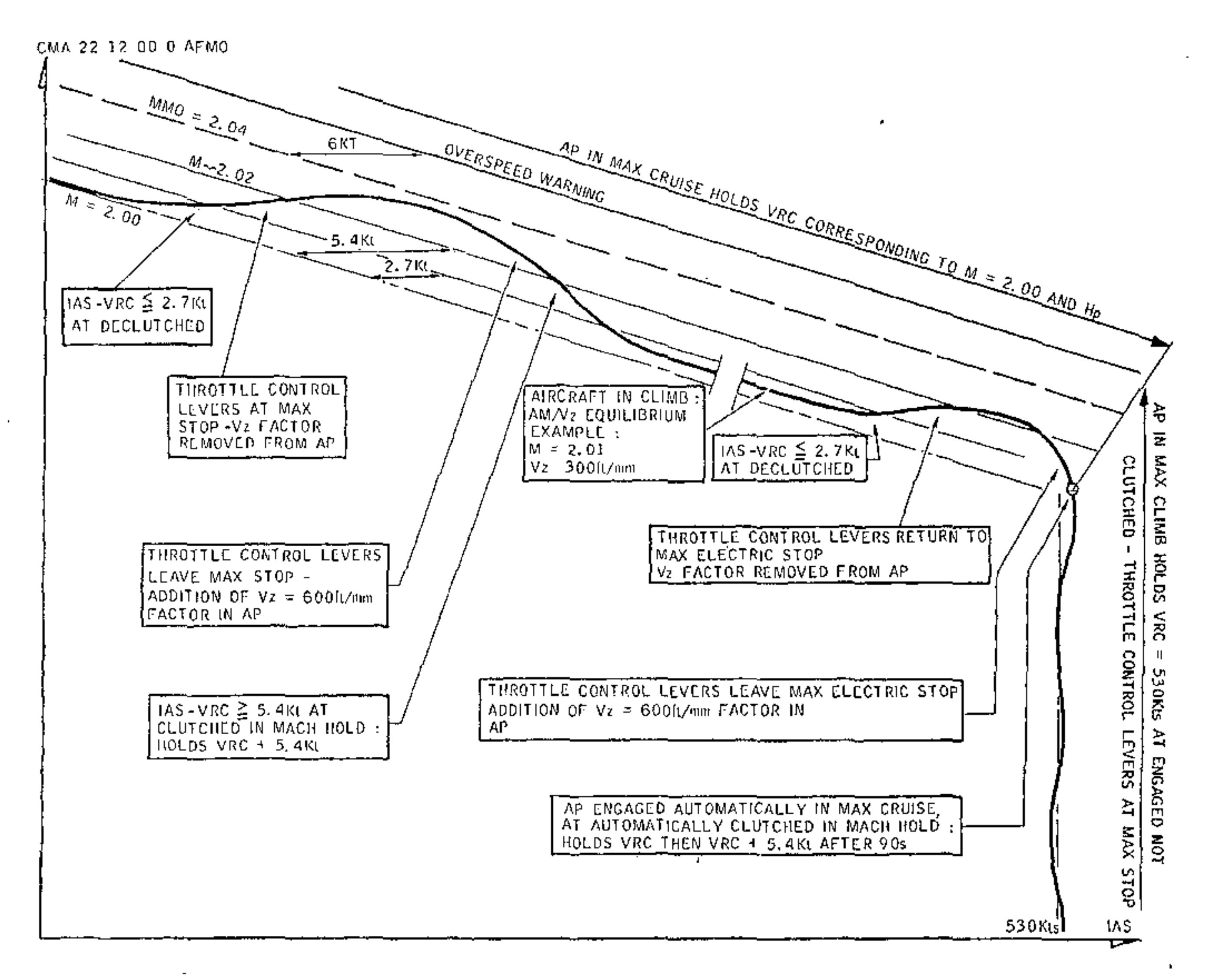
D. MAX CLIMB - MAX CRUISE Modes (Ref. Fig. 004)

The engagement logic for these two modes is identical to that of the AP/FD.
As for the MACH HOLD mode, the ADC validity signal covers the failures detected in the air data system reference data.

These two modes enable the aircraft speed to be controlled during subsonic climb and through transonic to supersonic cruise flight using reference cruising speed (VRC) data provided by the ADC.

(1) MAX CLIMB mode

When the aircraft IAS approaches VMO (IAS and VMO pointers in the same position on the airspeed indicator), the pilot selects the MAX CLIMB mode and engages the associated autothrottle. The AP/FD holds an IAS of 530 knots, while the autothrottle is armed but not active (throttle control levers not clutched to actuator) and no mode is indicated.



MAX CLIMB and MAX CRUISE Modes
in a Cold Atmosphere
Figure 004

EFFECTIVITY: ALL

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NOTE : The IAS held may be adjusted by operating the NOSE UP/NOSE DOWN switch on the AFCS datum adjust unit. This adjustment is limited to ± 16 knots, with two variation rates.
- 0.9 knots per second, first position of switch (slow adjustment)
- 2.9 knots per second, second position of switch (fast adjustment)

(2) MAX CRUISE mode

The MAX CRUISE mode engages automatically. The ADC sends a logic signal when the reference cruising speed (VRC) ceases to be equal to VMO = 530 knots (change-over point) due to Mach limitation (M = 2) or temperature limitation (TMO).
The AP/FD changes to MAX CRUISE mode (the MAX CLIMB and MAX CRUISE push-buttons are both illuminated) and the autothrottle is clutched in MACH HOLD mode.

The AP/FD holds the reference cruising speed (VRC) corresponding to Mach 2 if the aircraft speed is limited by MMO, or the VRC corresponding to TMO if the aircraft speed is limited by TMO.

The autothrottle initially holds the same value as the AP/FD, then an increment of 5.4 knots is progressively added in the autothrottle, causing it to hold a slightly value to that held by the AP.

The ceiling is captured when an equilibrium is established between the AP, which tends to hold M = 2, and the autothrottle, which tends to hold M = 2.02. To obtain an acceptable speed for climb to the ceiling, a vertical speed (Vz) factor (600 ft. per minute) is added in the AP/FD if the throttle control levers leave the maximum electric stop.

The cruise flight equilibrium state is reached when the throttle control levers return to the maximum electric stop position. The Vz factor is progressively removed from the AP/FD. When IAS-VRC is less than or equal to 2.7 knots, the autothrottle is declutched and in standby (the MACH HOLD push-button extinguishes). The AP/FD then holds M = 2.

NOTE 1 : In the case of overspeed in the MAX CRUISE mode (speed greater than M = 2.02), the autothrottle is clutched and the MACH HOLD push-button illuminates.
This immediately holds VRC + 5.4 knots

(M = 2.02). As soon as the throttle control levers leave the maximum electric stops, a factor of Vz = 600 ft. per minute is added in the AP/FD.
Autothrottle operation and declutching conditions are then the same as when passing through the change-over point.

NOTE 2 : If the aircraft drops below the change-over point, the MAX CRUISE mode disengages automatically (MAX CRUISE push-button extinguishes). The AP/FD controls the aircraft in the aircraft in the MAX CLIMB mode, in the same conditions as during the climb.

When the aircraft climbs above the change-over point again, the MAX CRUISE mode engages once more and the autothrottle is clutched in MACH HOLD mode.

NOTE 3 : In the MAX CRUISE mode, operation of the NOSE UP/NOSE DOWN switch on the AFCS datum adjust unit has no effect. In addition, if the datum was changed in the MAX CLIMB mode, this is cancelled on automatic change-over to MAX CRUISE mode.

E. IAS HOLD MODE

The engagement logic for this mode is identical to that for the AP/FD system.
As for the MACH HOLD mode, the failures detected in the air data system reference data are covered by the ADC validity signal.
IAS HOLD mode selection is provided by pressing the IAS HOLD push-button. The push-button illuminates and the aircraft speed is maintained to the indicated airspeed (IAS) existing at the time of engagement.

The IAS value maintained may be changed through operation of the NOSE UP/NOSE DOWN switch located on the AFCS datum adjust unit.
The adjustment range is ± 20 knots, with two adjustment rates :

- 0.7 knot per second, first position of switch (slow adjustment).

- 2 knots per second, second position of switch (fast adjustment).

F. ALT HOLD MODE

The engagement logic of this mode is identical to that of the AP/FD system.
The failures detected in the air data system reference data are covered by the ADC validity signal.

This mode is selected by pressing the ALT HOLD push-button. The push-button illuminates and the aircraft is maintained at the barometric altitude existing at the time of engagement.

The value of the altitude to be maintained may be changed through operation of the NOSE UP - NOSE DOWN switch located on the AFCS datum adjust unit. The variation rates are the following :

- 23 feet per second, first position of switch (slow adjustment).
- 70 feet per second, second position of switch (fast adjustment).

G. ALT ACQ Mode

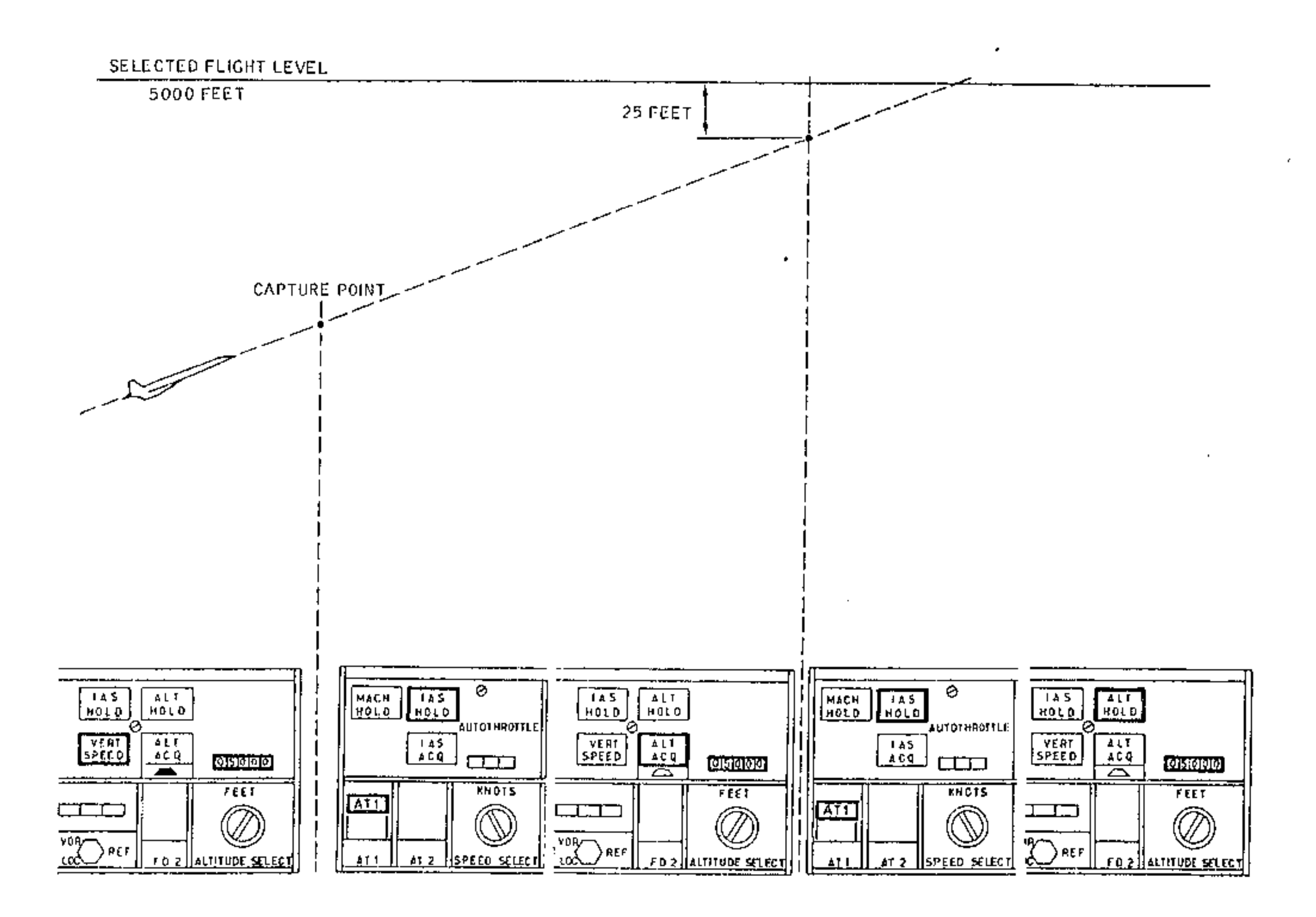
On selection of this mode, the altimeter (ALT BARO F/W) validity signal is added to the AP/FD engagement logic.

This mode allows selection and acquisition of a flight level which is displayed on the AFCS control unit. The sequences described below are symmetrical (climb or descent).

(1) Standard Flight Level Change
(Ref. Fig. 005)

After selection of the desired altitude by means of the AFCS control unit ALTITUDE SELECT knob (5000 ft for instance), the pilot selects this mode by pressing ALT ACQ push-button, which causes the ALT ACQ push-button prime indicator light to illuminate, indicating that the mode is selected but not active and that the previously selected pitch mode is still controlling the aircraft (VERT SPEED for instance).

When the capture point is reached (at a certain distance from selected flight level depending on the aircraft vertical speed), capture is automatically initiated, which causes the prime indicator light and the VERT SPEED push-button to extinguish and the ALT ACQ push-button to illuminate.



Standard Flight Level Change
Figure 005

EFFECTIVITY: ALL

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When the aircraft enters the desired altitude corridor (± 25 feet), the ALT ACQ push-button extinguishes and the ALT HOLD push-button illuminates. The AP system automatically reverts to ALT HOLD mode.

NOTE : The altitude capture procedure includes the engagement of an autothrottle lane.

If the AP is engaged in a speed hold mode, the autothrottle will only be pre-engaged. It will not provide speed holding after capture.

If the AP is not engaged in a speed hold mode, the autothrottle will provide this speed holding throughout the capture phase.

If no autothrottle is engaged, the red AT warning lights will flash on both Warning and Landing Display indicators when entering capture phase. The pilot will cancel the warnings by engaging an autothrottle channel

(2) Increase of Flight Level during Capture Phase (Ref. Fig. 006)

The sequence is the following :

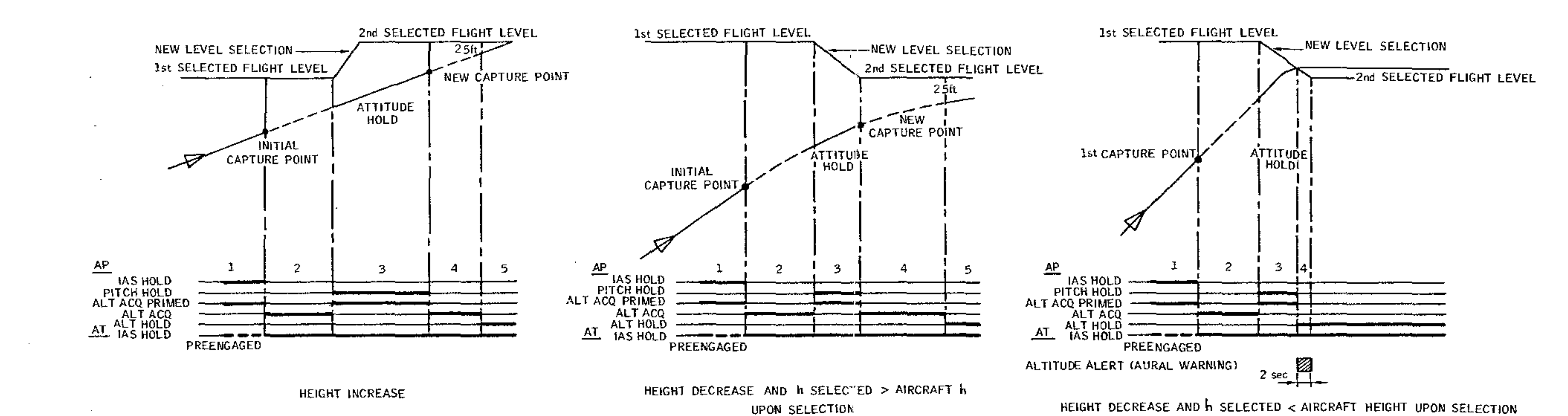
- Phase 1 : Pre-capture with AP engaged in speed holding mode.
- Phase 2 : Altitude captured
- Phase 3 : On flight level change, the AP engages in PITCH HOLD and primed ALT ACQ modes. The pilot can change the attitude by means of the NOSE UP - NOSE DOWN switch located on the AFCS datum adjust unit.
- Phase 4 : New altitude captured
- Phase 5 : Holding of new flight level.

(3) Decrease of Flight Level during Capture Phase (Ref. Fig. 006)

In this case, the aircraft flight path does not correspond with the flight path selected.

(a) If the new selected altitude is greater than the aircraft altitude existing at the time of selection, the sequence adopted will be as indicated above.

(b) If the new selected altitude is lower than the aircraft altitude at the time of selection, the sequence is the following :



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Increase of Flight Level during Capture Phase
Figure 006

- Phase 1 : Pre-capture with AP engaged in speed hold mode.
- Phase 2 : Altitude captured
- Phase 3 : On flight level change, the AP engages in PITCH HOLD and primed ALT ACQ modes
- Phases 4 and 5 : When aircraft height (h) minus selected height (h) becomes zero and then changes sign, the AP engages immediately in ALT HOLD mode.

The altitude alert system then triggers an aural warning, which sounds for approximately 2 seconds, to warn the pilot that the altitude held by the AP system is not the altitude selected on the AFCS control unit ALTITUDE SELECT knob counter.

NOTE : When a change in flight level occurs during capture phase, if either or both FDs are engaged, the associated ADC bars disappear when the AP system in control is in PITCH HOLD mode.
When engaging ALT HOLD mode (either at the end of capture or when aircraft altitude h minus altitude h selected becomes zero and then changes in sign) the FD or FDs will revert to ALT HOLD.
The logic sequence with the FD (s) only engaged is identical to the AP sequence.

(4) Flight Level Change from ALT HOLD Mode
(Ref. Fig. 007)

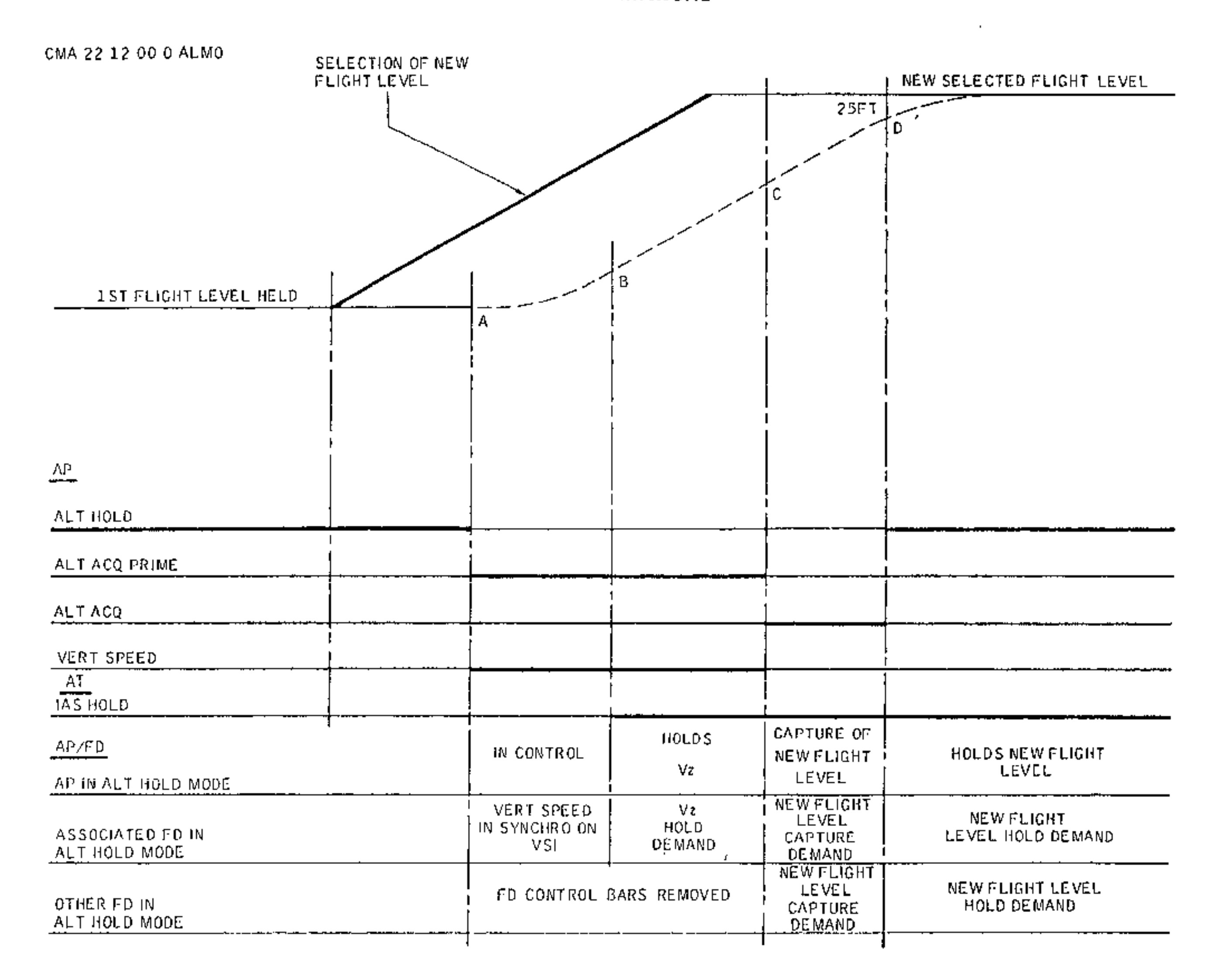
The pilot displays the new flight level, selects ALT ACQ mode, and the aircraft automatically reaches the new level.

Fnom point A, the AP orders a change in aircraft attitude until the vertical speed reaches a certain value at which VERT SPEED is automatically engaged. At present, this value is set to 800 ft per minute. If the pilot considers the value is not correct, he can modify it by means of the NOSE UP - NOSE DOWN switch.

At point C, the AP system enters capture phase. At point D, the ALT HOLD mode engages.

An autothrottle lane must be engaged at the latest when point C is reached. Otherwise, red AT warning lights flash on both W & LD indicators.

NOTE 1 : If the AP is engaged and if either or both



Sequence of Flight Level Change from ALT HOLD Mode
Figure 007

FD(s) is (are) engaged, FD operation will be as indicated in the figure.

NOTE 2 : On selection of ALT ACQ mode, the VERT SPEED mode engages automatically whether the AP is engaged or disengaged, if either or both FD(s) is (are) engaged. However, while the sequence is entirely automatic with AP control (change of aircraft attitude until the vertical speed reaches 800 feet per minute, value from which the AP system engages in VERT SPEED mode), the ADI pitch control bar does not receive any order and the pilot must set the desired vertical speed by means of the AFCS datum adjust unit NOSE UP - NOSE DOWN switch. After this, the capture phase ends normally.

H. VERT SPEED Mode (Ref. Fig. 008)

On selection of this mode, the vertical speed indicator validity signal (VSI F/W) is added to the AP/FD engagement logic.
(Vertical Speed Indicator (VSI) failure is indicated by a flag appearing on the indicator).

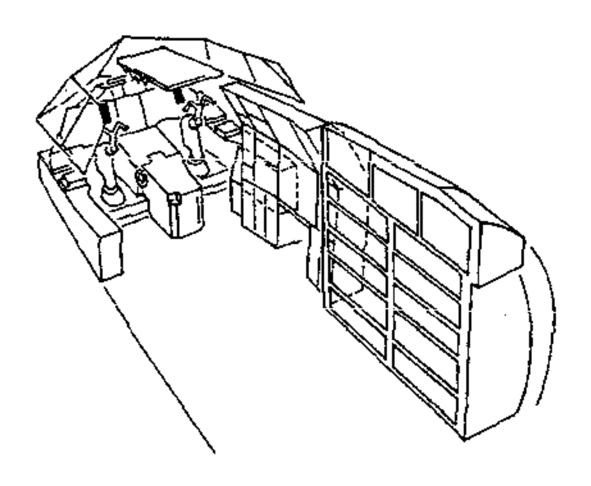
In this mode, the AP/FD system holds the vertical speed existing at the time of mode engagement. On activation of the VERT SPEED push-button, pointer 1 is immobilized at its existing value and provides the vertical speed reference. However, pointer 2 position depends on the aircraft vertical speed, which is calculated by the ADC.
The discrepancy between the two pointers provides the error signal required to maintain a constant vertical speed.

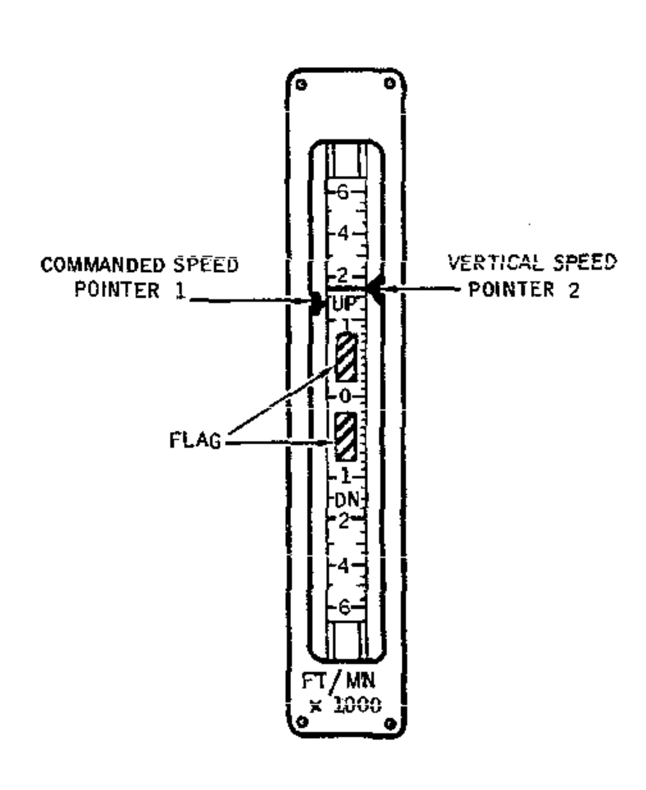
The AFCS datum adjust unit NOSE UP - NOSE DOWN switch allows the vertical speed to be adjusted through activation of pointer 1 through all the vertical speed indicator range (+ 6000 to - 6000 ft per minute) with the following variation rates :

(1) 80 feet per minute per second, first position of switch (slow adjustment).

(2) 800 feet per minute per second, second position of switch (fast adjustment).

Depending on the engagement status of the AP/FD systems, control of pointer 1 of the VSIs and of the ADI pitch control bars is as indicated in the following table :





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Vertical Speed Indicator
Figure 008

SYSTEMS ENGAGEMENT STATUS	VSI 1	VSI 2	ADI 1	ADI 2
AP1 engaged in control FD1 and FD2 engaged	in control	in synchronization	pitch bar in view	pitch bar cancelled
AP2 engaged in control FD1 and FD2 engaged	in synchronization	in control	pitch bar cancelled	pitch bar in view
FD1 and FD2 engaged or FD1 only engaged	in control	in synchronization	pitch bar in view	pitch bar cancelled
FD2 only engaged	in synchronization	in control	pitch bar cancelled	pitch bar in view

NOTE : VSI in control : pointer 1 steady unless AFCS datum adjust unit NOSE UP - NOSE DOWN switch is operated.

VSI in synchronization : pointer 1 synchronized with pointer 2.

I. GLIDE Mode

On selection of this mode, the prime indicator lights located under the GLIDE and VOR/LOC push-buttons illuminate, indicating that LOC beam and GLIDE beam capture phases are initiated.

On LOC capture, the associated push-button illuminates while the prime indicator light and the previously selected azimuth mode push-button extinguish.

On GLIDE capture, the associated push-button illuminates while the prime indicator light and the previously selected pitch mode push-button extinguish.

The GLIDE and LOC beams capture logic is dealt with in the LAND mode section.

NOTE : This mode is incompatible with Flare, Decrab, automatic throttling down and runway guidance sequences.

J. LAND Mode
(Ref. Fig. 009)

This mode allows capability II or capability III automatic approaches and landings.

The various phases for automatic approach and landing are the following :

(1) Interception Mode (Point A)

On the AFCS control unit, the pilot selects LAND mode. The prime indicator lights located under GLIDE, VOR/LOC and LAND push-buttons illuminate. The AP/FD system is engaged in any azimuth mode and any pitch mode, for instance HDG HOLD and ALT HOLD (2000 feet). The autothrottle system is engaged in IAS ACQ mode and an approach speed has been selected.

On LAND mode selection, the second AP channel may be engaged.

(2) LOC Capture (Point B)

This results in VOR/LOC push-button illumination while the associated prime indicator light and HDG HOLD push-button extinguish.

The engagement logic of the VOR/LOC mode is as follows :

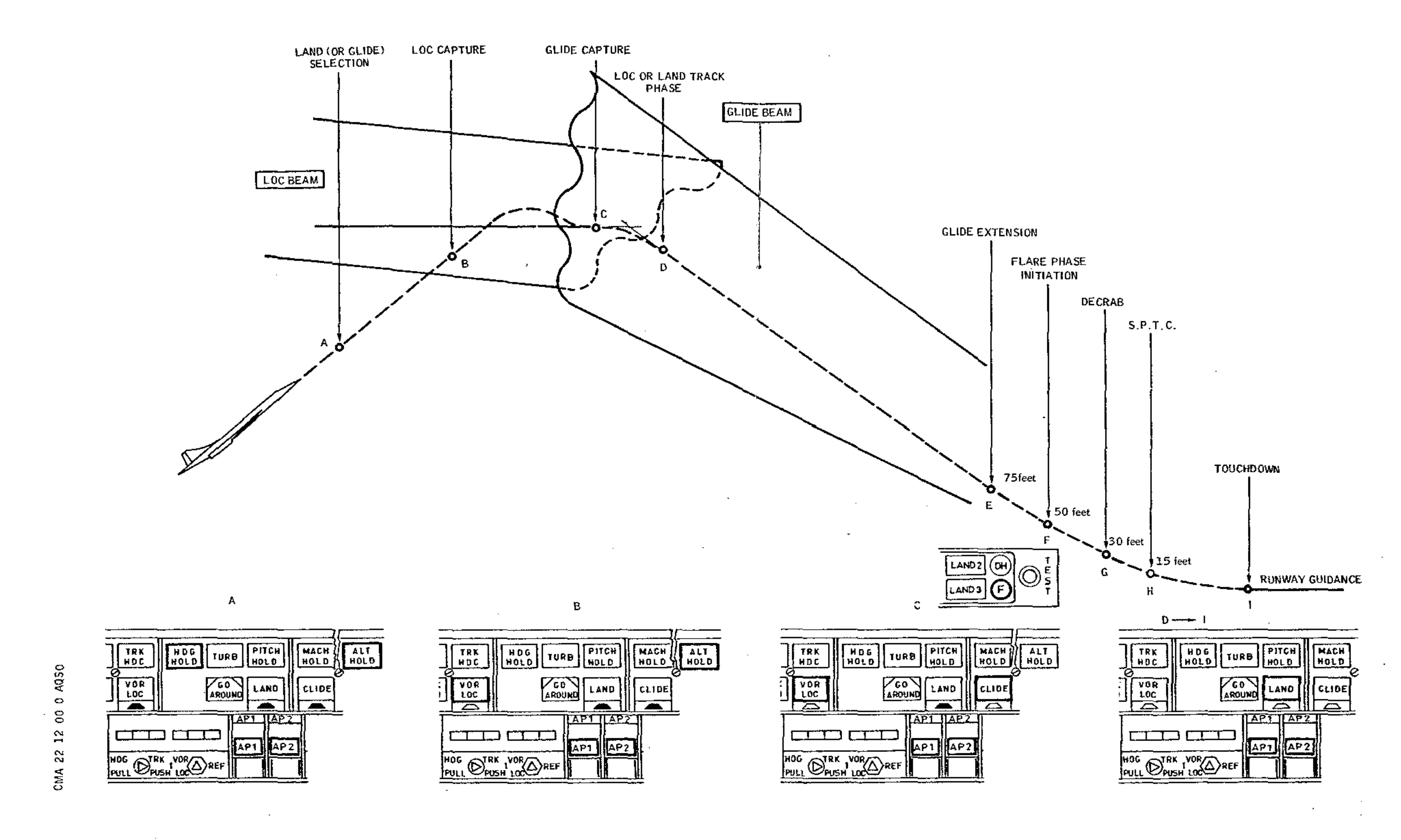
- LOC frequency selected
- No failure of LOC receiver
- Capture detected by the detectors on the analog channels.

(3) GLIDE Capture (Point C)

This is indicated by GLIDE push-button illumination, while the associated prime indicator light and ALT HOLD push-button extinguish.
The engagement logic of the GLIDE mode is as follows :

- No failure of GLIDE receiver
- Capture detected by the detectors on the analog channels.

After GLIDE capture in LAND mode, the radio altimeter



Various Phases of an Automatic Landing
Figure 009

validity signal is monitored by the Warning and Landing Display (W & LD) computer (Ref. 22-41-00, Description and Operation).

(4) LOC TRACK (Point D)

The LOC beam holding phase is initiated when the TRACK condition is obtained (determined by a sensor).

This switching results in a change in push-button illumination (LAND push-button illuminates, VOR/LOC and GLIDE push-buttons extinguish) if it occurs after GLIDE capture only.

(5) GLIDE Extension (Point E)

The Glide Extension phase is initiated at 75 feet by radio altimeter contact.
The GLIDE signal is cancelled and the AP/FD system ensures vertical speed holding.

AP/FD logic does not take into account GLIDE receiver and transmitter failures as the computation channels no longer use the GLIDE signal.

(6) Flare (Point F)

The Flare phase is initiated at a radio altimeter altitude lower than 50 feet when the vertical speed determined by the flare function is greater than or equal to the aircraft vertical speed.

(7) Decrab (Point G)

This phase is initiated at an altitude of 30 feet and provides alignment of the aircraft with the runway axis in order to reduce the lateral force on the landing gear at touchdown (Ref. 22-13-00, Description and Operation).

(8) Start Programmed Throttle Closure (Point H)

At 15 feet, the AP/FD system initiates an automatic throttling down.
The throttle control levers return towards the idle position at a rate of 4 degrees per second.

(9) Runway Guidance

After disengaging both APs (both FDs engaged only), the yaw pointers on both ADIs enable runway guidance

with reference to the LOC beam (Ref. 22-13-00, Description and Operation).

K. GO AROUND Mode

The Go Around function is initiated after LOC and GLIDE captures by disconnecting the autothrottle system and pushing at least two throttle control levers to maximum thrust position.

If approach was performed in GLIDE mode, the GLIDE and VOR/LOC push-buttons extinguish and the GO AROUND caption light illuminates on the AFCS control unit.
If approach was performed in LAND mode, the LAND push-button extinguishes and the GO AROUND caption light illuminates.
The GO AROUND mode provides for aircraft control until the preselected 15 degrees attitude is reached (pitch axis), and for aircraft holding of the localizer beam heading (azimuth axis).

This mode remains engaged unless the pilot disengages the AP system or selects HDG HOLD basic mode. The aircraft is then controlled in heading hold and in 15 degrees attitude hold.

3. Computer

A. Description

These are each contained in a half ATR short case, and weigh 13 kg. Computer No.1 is mounted on shelf 4-215, computer No.2 is mounted on shelf 4-216.

Each computer is installed on the shelf by means of two grip handles which also allow computer removal.

Between the handles two connectors, ZA and ZB, are provided to test the computer.

When the computer is supplied with power, the elapsed time indicator starts operating and the pointer starts vibrating.

On the rear panel, 4 connectors are provided for connection to the aircraft wiring.

B. Composition

Each computer comprises :

(1) 1 power supply unit.

(2) Logic circuit boards

These circuit boards contain the AP engagement logic circuits, the pitch mode engagement logic circuits and the altitude alert logic circuits.

(3) Control and monitoring analog circuit boards, which include common and pitch mode analog circuits (for common modes, pitch function only).

C. Power Supply Unit

The power supply unit generates + 15 V, - 15 V and +7 V (control and monitoring) from a 115 V 400 Hz power supply.

A monitoring circuit causes this power supply to be cut out following any of these failures :

- Failure of + 28 V supply
- Failure of (control and monitoring) + 5V supply generated from the + 7 V supply
- Failure of + 15 V supply
- Failure of - 15 V supply
- Failure detected through comparison between the - 15 V supply generated in the pitch computer and the - 15 V

supply generated in the azimuth computer (this comparator is located in the azimuth computer).

NOTE : This cut can be seen on the elapsed time indicator : the pointer stops vibrating.
After loss of 115 V 400 Hz power supply and repair, the computer will not be supplied with power until circuit breaker 1C18 or 2C18 (computer No.1 or computer No.2) has been tripped and then reset.

The interlocks between the AP/FD pitch computer power supply unit and AP/FD azimuth computer power supply unit, as well as the interlocks between these power supply units and the system using the +15V and -15V logic voltages, are dealt with in 22-11-00, Description and Operation, paragraph 8.

D. AP Engagement Logic

AP engagement logic is dealt with in 22-11-00, Description and Operation, paragraph 4.

E. Mode Logic

The signal from the mode selection push-button is converted into a binary code (distinct code for each mode) then stored in registers.

This binary signal is then decoded to obtain the mode selection signal (this signal is transmitted to the registers for cancellation of the previously engaged mode). Each decoder output is associated with a specific mode.

The selection signal is transmitted to the register and to the decoder through a mode selection push-button anti jam circuit.

NOTE : There is no limitation in mode selection. The mode engages when the logic is healthy.
Mode logic is described at the level of mode operation, except for GLIDE, LAND, TURB and GO AROUND modes, the logic of which is dealt with in 22-13-00, Description and Operation.
In certain modes, a validity signal for the peripheral equipment associated with the active mode is added to the AP/FD engagement logic.
On failure of the mode, the AP/FD system disengages and the associated warnings are initiated (Ref. 22-11-00, Description and Operation, paragraphs 4 and 5).

F. Altitude Alert System

The altitude alert system provides the pilots with information on distance from the selected flight level.
The aircraft has 2 altitude alert systems. System 1 is contained in AP/FD pitch computer No.1 and system 2 is contained in AP/FD pitch computer No.2.

The warnings consist of :

(1) A 650 Hz aural warning.

(2) Two amber warning lights, one located on the Captain's altimeter, the other on the First Officer's altimeter.

The altitude alert system is dealt with in 22-11-00, Description and Operation.

G. Analog Channels
(Ref. Fig. 010)

(1) Description

The main part of the computation channels is common to the AP and the FD systems to inner loop level ; these two channels are then separated and their signals are transmitted either to the relay jack (AP system) or to the Attitude Director Indicators (FD system).

These computation channels may be divided into two parts :

(a) The circuits specific to each mode which generate control signals and constitute the outer loop.

(b) The circuits, which constitute the inner loop (or basic loop) and are common to all the modes and process the following control signals :

- Outer loop control signals : generated by the channels specific to each mode.
- Pitch and lateral attitudes provided by the INS'
- Pitch rate from the rate-gyros. This signal is processed in the autostabilization computers, then issued to the AP/FD system.

NOTE : Lateral and pitch attitudes are complementary filtered to obtain a pitch rate inner loop slaving signal.

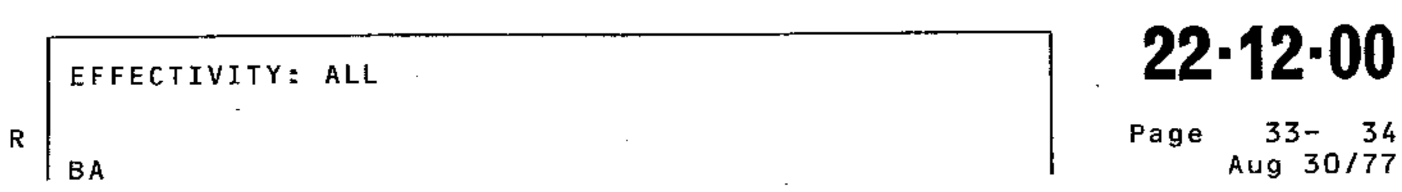
(2) Operation

(a) Outer Loop

INTENTIONALLY BLANK

INS No.1
PITCH ATTITUDE
ROLL ATTITUDE
AUTOSTAB COMPUTER No.1
PITCH RATE
ADC1
MACH NUMBER
DOUBLE DETECT
GO AROUND MONITOR
C3
PITCH TURB GO AROUND CONTROL
PITCH HOLD TURB GO AROUND
SINGLE DETECT
ALT HOLD CONTROL
ALT HOLD
ALT ACQ CONTROL
ALT ACQ
VERT SPEED CONTROL
VERT SPEED
MAX CLIMB CONTROL
MAX CLIMB
MAX CRUISE CONTROL
MAX CRUISE
SPEED MODE
MACH HOLD CONTROL
MACH HOLD
IAS HOLD CONTROL
IAS HOLD
GLIDE LAND CONTROL
GLIDE LAND
GLIDE LAND MONITOR
C5
FLARE CONTROL
C2
FLARE
FLARE MONITOR
OUTER LOOP
OUTER LOOP SIGNAL
ANALOG CONTROL SIGNAL
ANALOG MONITOR SIGNAL
CMA 22 12 00 0 ASS 0
DEMOD
SPEED MODES
GO AROUND
15° OFFSET
F (1/M)
PITCH BAR REMOVAL
GO AROUND OR DATUM ADJUST IN PITCH HOLD
C11
ADI INNER LOOP
W & LD COMPUTER No. 1
W & LD COMP No. 2
FROM PITCH COMP No. 2
FD1
FD2
CAPT SW
F/O SW
ADI No. 1
ADI No. 2
FUNCTION GENERATOR
WASHOUT
SWITCHED LEAD/LAG
F (M)
PITCH RATE
AUTHORITY LEVEL SWITCH
INT
FTCM
DA IN PITCH OR TURB OR VERT SPEED ROTATION
GAIN
SYNCH
ENG
DITHER
SERVO AMPLI
CX
PITCH AUX SERVO DRIVE
SV
PITCH RELAY JACK
C8
C4
C7
C10
INT LEVEL SW
C9
LEVEL SWITCH
RELAY JACK INNER LOOP

Analog Channels Operating Principle
Figure 010


EFFECTIVITY: ALL
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In cruise modes, the analog channels are not duplicated and demand signals are issued by single sensors.

In approach modes, the analog channels are duplicated : a control channel transmits the demands while a second identical monitoring channel issues signals for comparison of the two channels.

All these circuits will be further detailed in the Operation paragraph.

(b) ADI Inner Loop

(b1) The pitch control bar receives the signal generated by the channels specific to each mode, except in GO AROUND mode or when datum adjust unit control is used in PITCH HOLD mode.

(b2) The pitch rate and pitch attitude signals are used in GO AROUND mode.

(b3) A PITCH BAR REMOVAL logic signal cancels PITCH CONTROL BAR signal in the following conditions :
- when the AP only is engaged.
- when the AP and the FD are in PITCH HOLD mode.
- in the AP/FD channel which is not in control, in VERT SPEED or MAX CRUISE mode.

R (b4) When an approach mode is engaged, the output amplifier gain is increased by 40 percent.

(c) Relay Jack Inner Loop

(c1) Before engagement

In order to avoid jerks on engagement of the AP system, the output signal must be synchronized with the control surface position. A level switch makes it impossible to engage the AP system if the output signal exceeds 0.5 deg.
Synchronization is ensured by an integrator.

The servo control dither is not active before AP engagement.

NOTE : In addition, the pitch attitude signal

is synchronized with a fast time constant in order to enable engagement irrespective of the aircraft attitude.

(c2) On engagement

Comparator C9 is active and results in AP disconnection when the difference between the demand and the position feedback is greater than 2 degrees.
The outer loop signal is summed with an integral term to remove any steady state offsets. The integral term is removed when the demand exceeds 0.05 g as detected by the authority level switch.

The gain changes are a function of the Mach number provided by the air data computer.

The full time command modifier (FTCM) limits AP authority to 0.15 g, with a variation rate of 0.05 g per second. When the datum adjust unit is used with AP engaged in PITCH HOLD mode or TURB mode, a signal is fed into the FTCM to vary the aircraft pitch attitude. This circuit is also used to bring the aircraft vertical speed to 800 ft. per minute when an altitude change is desired (see ALT ACQ operation).
The dither improves servo valve operation.

(3) Monitoring

Monitoring of these channels is based on the use of monitored duplicate computation channels, with comparison between the two channels.
This comparison is ensured at several points called consolidated points.
The comparators are located so that their thresholds are affected only by drift of 4 or 5 amplifiers . This enables a comparison with low monitoring thresholds.

Comparators C4, C7, C8, C9, C10 and C11 are active irrespective of the mode engaged.

- C4 monitors the outer loop integrator.
- C7 monitors the pitch rate signal.
- C8 monitors Mach data.
- C9 monitors the pitch relay jack position.
- C10 monitors the demands to the pitch relay jack.
- C11 monitors the demands to the ADC.

Comparators C2, C3 and C5 are active during approach only.

- C2 monitors the vertical speed signal in Glide extension and flare phases.
  It is active between 600 feet and the ground, with AP/FD engaged, in LAND mode only.
- C3 monitors the pitch attitude signal.
  It is active when the AP/FD is engaged, after GLIDE capture and down to 100 feet, in LAND mode or GLIDE mode.
- C5 monitors the demanded pitch rate signal.
  It is active when AP/FD is engaged, after GLIDE capture, in LAND mode or GLIDE mode.

4. Pitch Relay Jack Sensor

A. Description
(Ref. Fig. 002)

The pitch relay jack sensor generates position feedback signals from the pitch relay jack. This sensor is mounted on the relay jack chassis.

Extension of the relay jack is transmitted via a trailing link which drives four synchros via a gear train contained in a drive housing.

The relay jack has a normal extension of ± 1.6 in. (± 40 mm) which corresponds to ± 15 deg. of lever assembly angle and ± 30 deg. of synchro rotation.

For transit, a transit support brace is fitted.

An adjustment device which modifies the input lever geometry enables the electrical zero of the four synchros to be set simultaneously. This adjustment is required only when there is a discrepancy between the RJ pinned to the flight controls zero and the synchros which are pre-adjusted by means of a template before installation on the aircraft.

B. Operation (Ref. Fig. 011)

The PITCH RELAY JACK POSITION AC output signals are routed to the appropriate autopilot channels.

The wiring to synchros B1 and B2 for channel 1 is isolated from the wiring to synchros B3 and B4 for channel 2. Separation is achieved by using electrical connectors (PA - Channel 1 and PB - Channel 2).

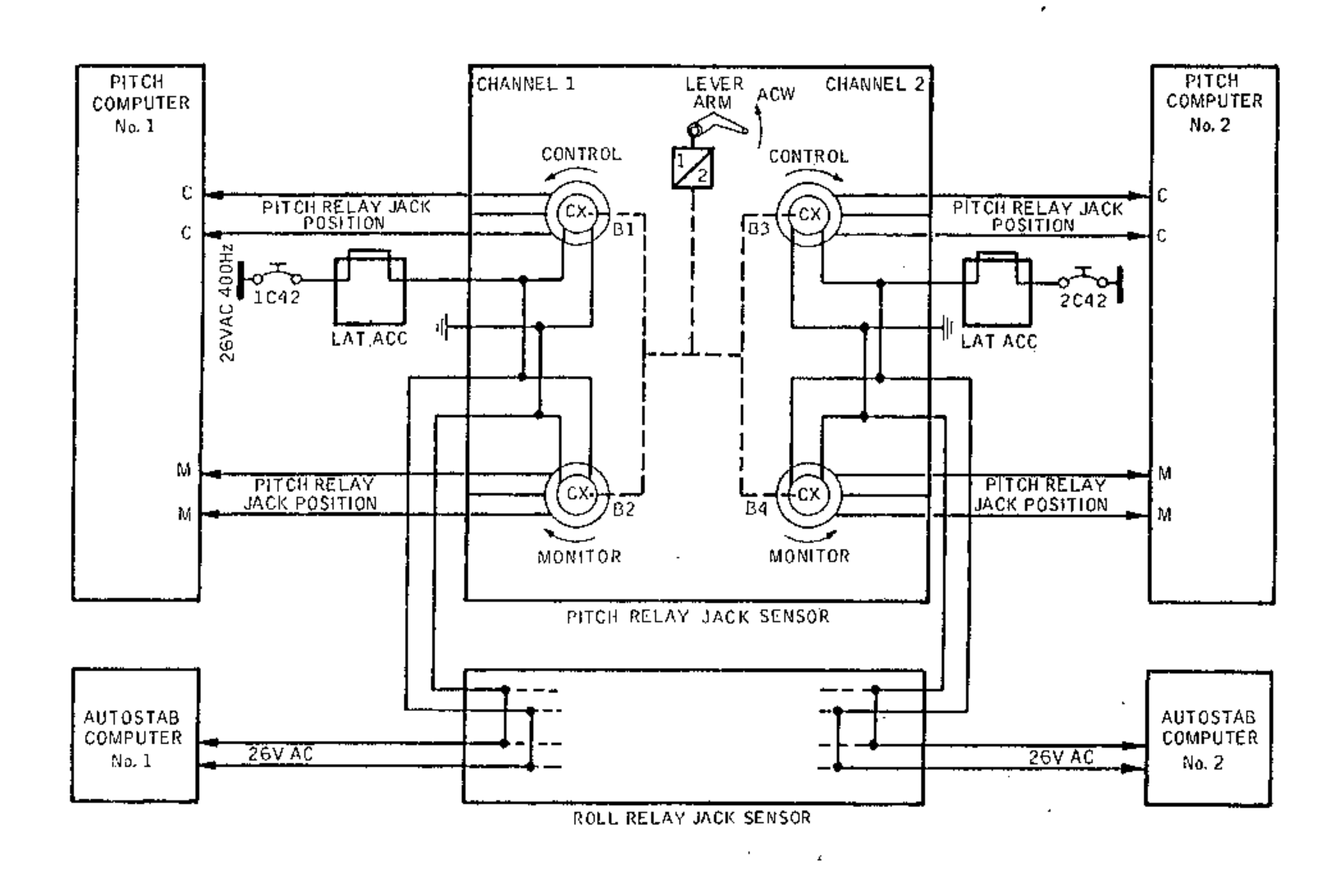
The synchros are provided with 26 V 400 Hz AC supply from the autostabilization system circuit breakers.

Circuit breaker 1C42 supplies channel 1 synchros B1 and B2.

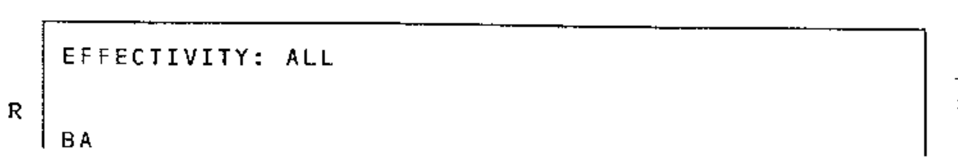
Circuit breaker 2C42 supplies channel 2 synchros B3 and B4.

The autostabilization computer monitors the lateral accelerometer supply as well as the pitch and roll relay jack sensors supply.
A supply cut-out prevents autostabilization engagement and therefore, AP/FD engagement.

CMA 22 12 00 0 AUMO



Relay Jack Sensor Circuit Diagram
Figure 011



R

EFFECTIVITY: ALL

BA

5. Operation

A. PITCH HOLD Mode

(1) Mode Logic (Ref. Fig. 012)

The PITCH HOLD mode is coded, stored and decoded to obtain the mode engagement signal when any of the following signals is present :

(a) CANCEL LAND signal present

- On selection of PITCH HOLD mode.

NOTE : If the AP/FD system is primed in ALT ACQ, or GLIDE, or LAND mode, PITCH HOLD selection will result in the cancellation of the primed mode. The AP/FD system will engage in PITCH HOLD mode.

- On selection of HDG HOLD mode, provided the AP/FD system is engaged in LAND mode and after GLIDE capture.

(b) REVERT TO PITCH HOLD and ALT ACQ PRIMED signals present.

When the AP/FD system is engaged in altitude capture phase (ALT ACQ ENG) and the pilot selects a new flight level, if the difference between the aircraft altitude and the altitude selected is greater than 25 feet, PITCH HOLD mode is engaged and causes ALT ACQ mode to disengage, while ALT ACQ prime indicator light illuminates.

(c) REVERT TO PITCH signal is present :

- When an autothrottle channel is engaged and the AP/FD system is engaged in a speed mode, the AP/FD system reverts to PITCH HOLD mode. The circuits are incorporated in each autothrottle computer.

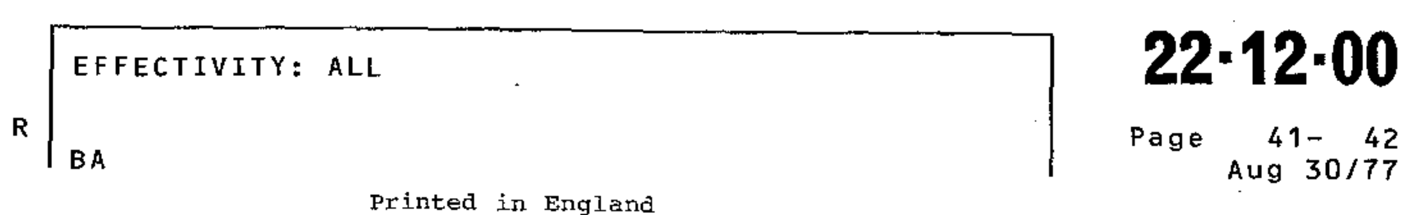
- If one channel is engaged in PITCH HOLD mode, the other engages in PITCH HOLD mode.

(d) Not CANCEL EXT MODE signal present :

- When GO AROUND, TURB or GLIDE mode is lost following engagement of HDG HOLD basic azimuth mode or (for TURB mode only) following engage-

A F C S CONTROL UNIT
SELECT PITCH HOLD
S Q
PITCH
A A P
ELP
GP OR LP
R
SELECT HDG HOLD
~GSC-ELP
KNOB ROTATE SPEED SELECT
CANCEL LAND
PITCH COMPUTER No.2
HEIGHT ERROR->25ft
AAE
REVERT TO PITCH HOLD AND ALT ACQ PRIME
AUTOTHROTTLE COMPUTER No.1
OTHER IN PITCH
REVERT TO PITCH
REVERT TO PITCH
REVERT TO PITCH
AUTOTHROTTLE COMPUTER No.2
PITCH
GO AROUND
TURB ENG
GSC
CANCEL EXT MODE
ENCODE PITCH
CODED MODE STORE
PITCH HOLD
PITCH HOLD
AFCS CONTROL UNIT
AZIMUTH COMPUTER No.1
OWN·FD
GA
HOLD
FF
S
R
REVERT TO PITCH WHEN AP ENG AFTER FD IN GA
TURB
PITCH COMPUTER No.2
OTHER AP ENG
OWN FD ENG
OTHER FD ENG
HOLD
DATUM ADJUST ON
DA IN PITCH OR TURB
AZIMUTH COMPUTER No.1
GSP
GSC
S120
ENTER LAND PHASE
ENG
CMA 22 12 00 0 AWM0

PITCH HOLD Logic
Figure 012


EFFECTIVITY: ALL

R BA

ment of any azimuth mode the AP/FD reverts automatically to PITCH HOLD mode.

(e) When GO AROUND mode is engaged with FD only engaged, on engagement of AP system the PITCH HOLD mode engages and cancels GO AROUND mode.

NOTE : If the AP system is engaged in GO AROUND mode, FD engagement will not result in cancellation of the GO AROUND mode. The PITCH HOLD mode must be selected to result in cancellation of the GO AROUND mode.

(f) Not ENG signal present :

- When neither AP channel and neither FD channel is engaged, the PITCH HOLD mode is encoded and on engagement of one AP or FD channel, the ENG signal is present and the PITCH HOLD mode is engaged.

- When the FD system is engaged in an approach mode : GLIDE (primed or engaged), or LAND (primed or engaged), the AP can engage only in the same mode as the FD.

- When the PITCH HOLD mode is engaged and the pilot activates the datum adjust unit NOSE UP - NOSE DOWN a DA IN PITCH logic signal results in inhibition of the Outer Loop signal and generation of an attitude variation signal (Ref. RJ Inner Loop).

(2) PITCH HOLD analog channel

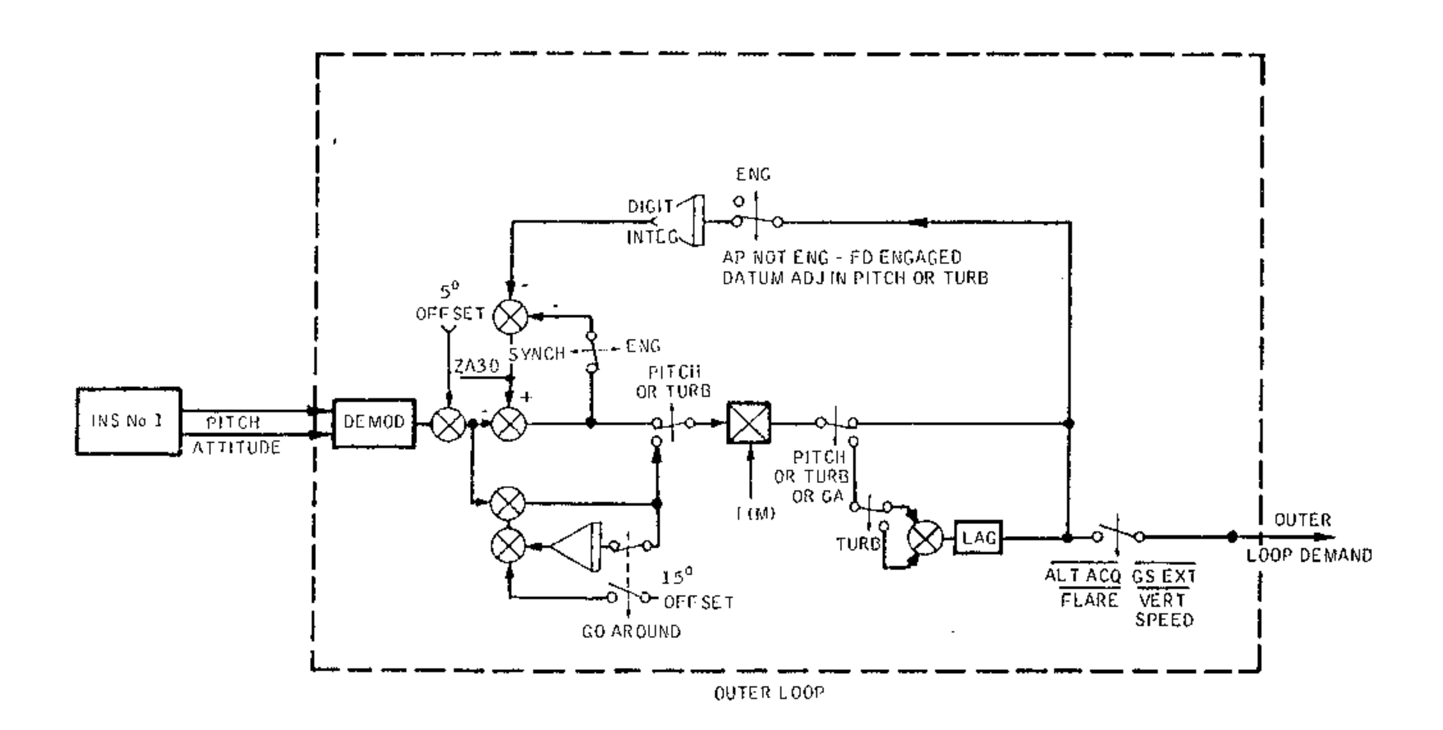
(a) PITCH HOLD Outer Loop (Ref. Fig. 013)

Before engagement, the digital integrator in the control channel is in synchronization with the attitude at that moment. On engagement, the digital integrator stores the attitude value at the time of engagement and the OUTER LOOP DEMAND signal depends on the discrepancy between the actual aircraft attitude and the stored attitude value. The aircraft is controlled to hold the attitude obtained before engagement.

R (b) Inner Loop (Ref. Fig. 010)

The value of the attitude held can be changed by means of the AFCS datum adjust unit AUTOPILOT NOSE

CMA 22 12 00 0 AYMO



PITCH HOLD, TURB and GO AROUND Outer Loop
Figure 013

UP - NOSE DOWN switch.

As long as the pilot acts on the datum adjust unit NOSE UP - NOSE DOWN switch, the OUTER LOOP DEMAND signal is inhibited and another signal is generated for adjustment demand.

The FTCM limits this command to 0.05 g when the NOSE UP - NOSE DOWN switch is placed in the 1st position, and to 0.15 g when placed in the 2nd position. When the pilot releases the switch, the inner loop receives the outer loop command signal.

NOTE : If the AP and FD systems are engaged in the PITCH HOLD mode, the pitch control bar does not appear on the ADI.
If the FD system is engaged in the PITCH HOLD mode, activation of the datum adjust unit NOSE UP - NOSE DOWN switch is ineffective.

B. TURB Mode

(1) Mode Logic

This mode engages on selection of the mode (activation of associated push-button) provided an AP channel is engaged. Selection of TURB mode results in FD system disengagement (if engaged).

If the AP/FD system is engaged in LAND mode after LOC capture or in GO AROUND mode, the TURB mode cannot be selected.

When the TURB mode is engaged and the pilot operates the datum adjust unit NOSE UP - NOSE DOWN switch, a logic signal (DA IN TURB) results in inhibition of the OUTER LOOP DEMAND signal and generation of a signal for variation of attitude demand (Ref. RJ Inner Loop).

The TURB mode logic circuit is incorporated in the AP/FD azimuth computer.

(2) TURB Analog Channel (Ref. Fig. 013)

When the TURB mode is engaged, the AP system reverts to the basic modes. On pitch axis, the same signals as in PITCH HOLD mode are used, though with smaller gains (pitch trim rotation rate is also slower).

This mode enables AP control in turbulence conditions

through a servo control loop with smaller gains.

C. IAS HOLD Mode

(1) Mode Logic (Ref. Fig. 014)

This mode engages on selection, provided the AP/FD system is not engaged in LAND mode, after GLIDE capture. An anti-jam circuit is incorporated in the selection circuit.

When the IAS HOLD mode is engaged :

(a) The outer loop digital integrator receives a reset pulse.

(b) The ADC resolver associated with this mode is clutched at the electrical zero.

On operation of the datum adjust unit NOSE UP - NOSE DOWN switch :

(a) A contact, S4, energizes the digital integrator.

(b) The resolver is de-clutched.

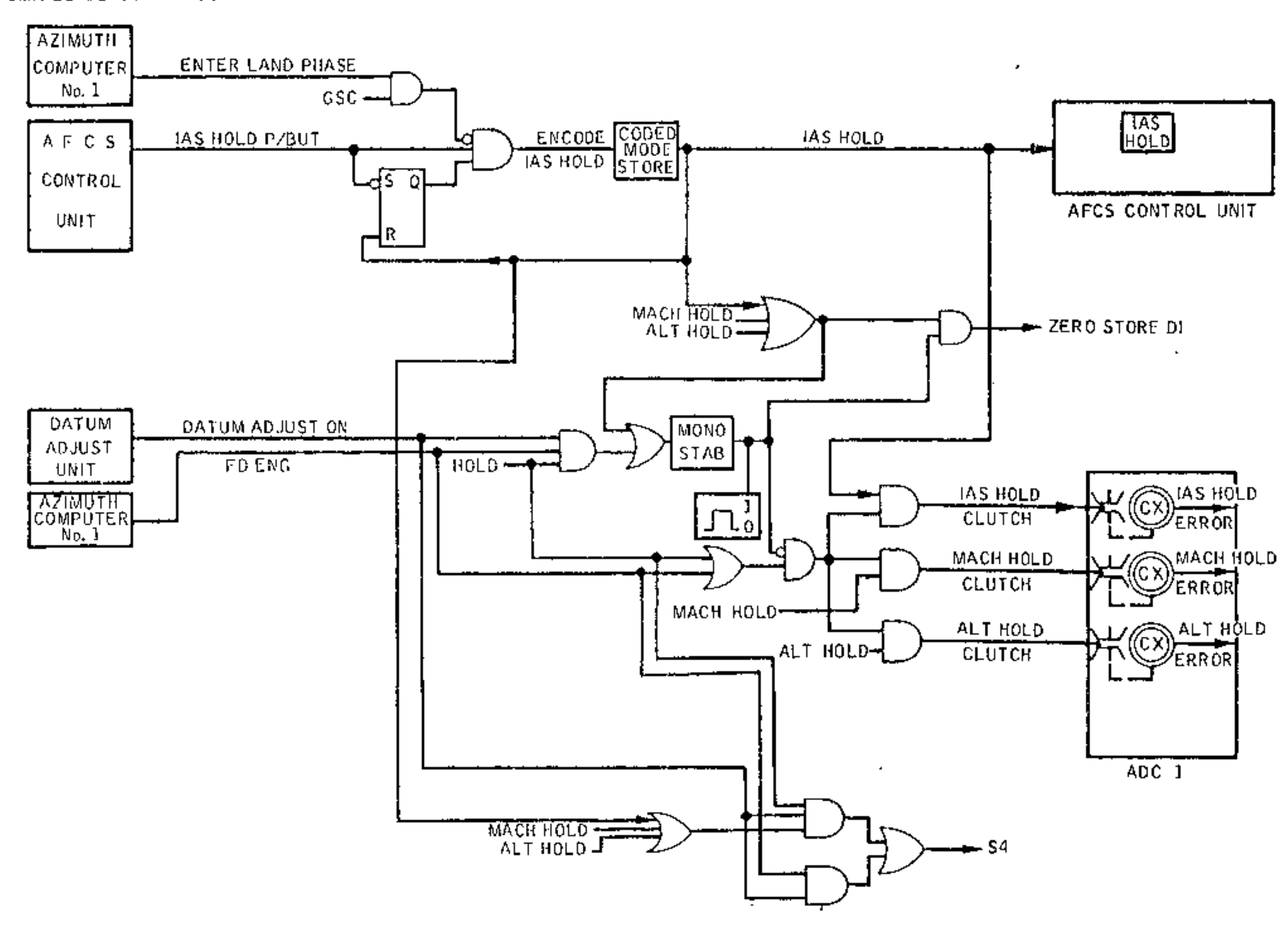
NOTE : The mode logic is similar for MACH HOLD and ALT HOLD modes.

(2) IAS HOLD Analog Channel (Ref. Fig. 015)

The IAS HOLD ERROR demand signal depends on the discrepancy between the true IAS and the IAS on engagement.

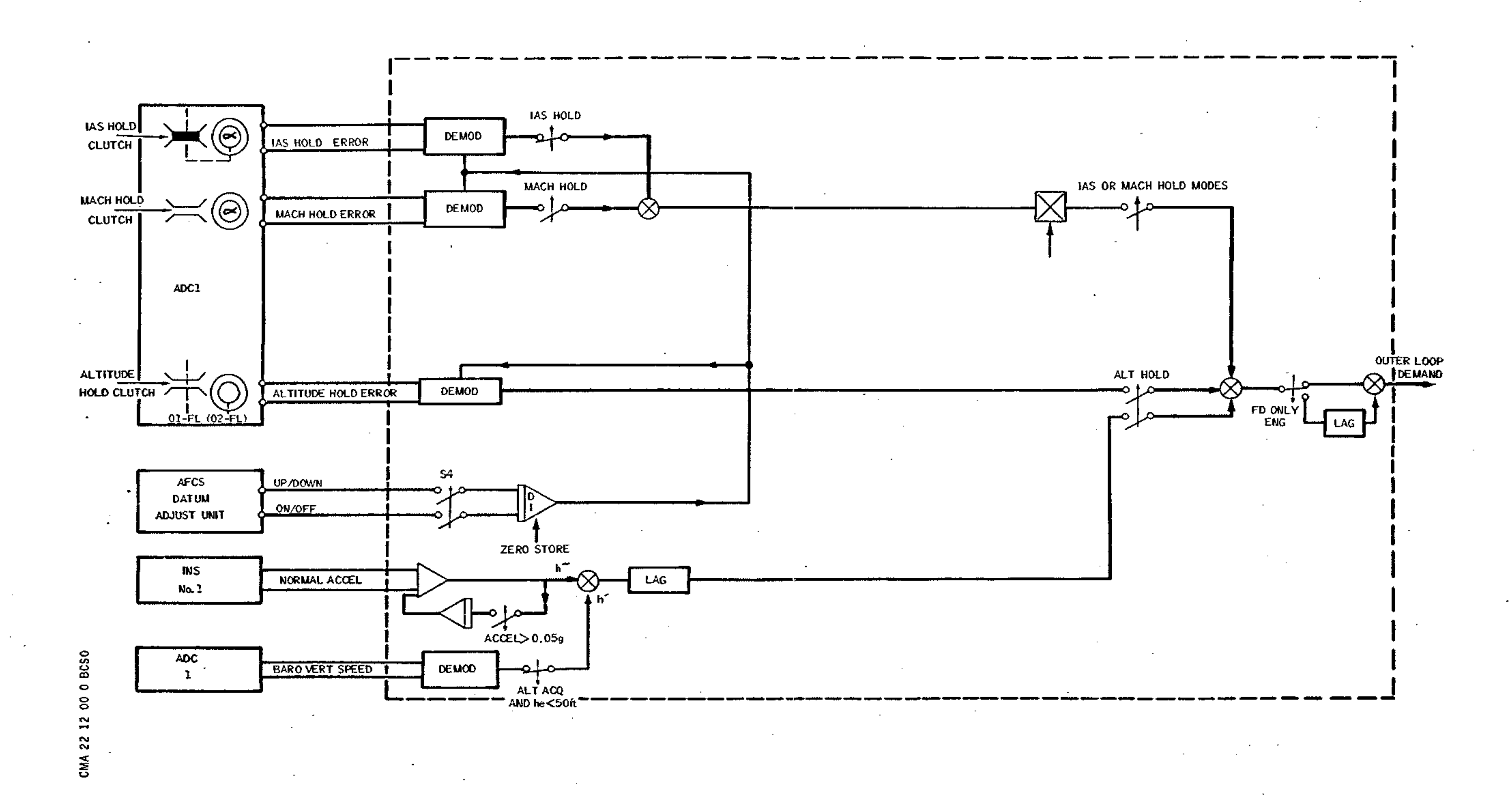
The value of the speed held may be adjusted by means of the datum adjust unit NOSE UP - NOSE DOWN switch.
For adjustment, a signal is issued to the digital integrator which adjusts the value of the speed held proportionally to the duration of operation of the datum adjust unit NOSE UP - NOSE DOWN switch. The maximum adjustment rate is ± 20 knots.
The resolver is declutched as long as the NOSE UP - NOSE DOWN switch is being operated.
When adjustment is completed, the switch is released, the resolver is clutched with the electrical zero corresponding to the new held speed value.

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R

IAS HOLD, MACH HOLD, ALT HOLD Logic
Figure 014



IAS HOLD, MACH HOLD, ALT HOLD Outer Loop
Figure 015

D. MACH HOLD Mode

(1) Mode Logic (Ref. Fig. 014)

AS does the IAS HOLD mode, the MACH HOLD mode engages on selection, provided the AP/FD system is not engaged in LAND mode after GLIDE capture.

When MACH HOLD mode is engaged :

(a) The outer loop digital integrator receives a reset pulse.

(b) The ADC resolver associated with this mode is clutched at the electrical zero.

When adjusted, by means of the datum adjust unit NOSE UP - NOSE DOWN switch :

(a) A contact, S4, energizes the digital integrator.

(b) The resolver is de-clutched.

(2) MACH HOLD Analog Channel (Ref. Fig. 015)

The MACH HOLD ERROR demand signal depends on the discrepancy between the true MACH number and the MACH number on engagement of this mode.
For adjustment, a signal is issued to the digital integrator which adjusts the Mach number proportionally to the duration of operation of datum adjust unit NOSE UP - NOSE DOWN switch (maximum adjustment : ± 0.06 Mach).

When adjustment is achieved, the MACH HOLD analog channel holds the new Mach number.

E. MAX CLIMB and MAX CRUISE Modes

(1) MAX CLIMB logic (Ref. Fig. 016)

This mode engages directly on selection, provided the AP is not engaged in LAND mode after GLIDE capture. An anti-jam circuit is incorporated in the selection circuit.

NOTE : The ALTITUDE ACQUIRE PRIME signal is generated on selection of the MAX CLIMB or ALT ACQ mode, to arm the autothrottle.
This signal is thus present in the MAX CRUISE phase. It is delayed by 50 ms at the beginning and the end of this mode to avoid disengagement on changing modes.

(2) MAX CRUISE logic (Ref. Fig. 016)

This mode engages directly using a TMO OR MMO SW logic signal generated by the ADC. This signal is locked. The MAX CRUISE mode is validated if the MAX CLIMB mode was previously engaged and the signal is on the side in control. The CRUISE signal is sent directly to the analog circuits and to the associated autothrottle. The autothrottle uses this signal for activation of the mode : analog switching, inhibition of MACH holding synchros, MACH HOLD override.

The AP/FD side in standby receives the active CRUISE signal to supply the associated autothrottle, to cancel its FD pitch control bar and to ensure complete illumination (2 bulbs) of the MAX CRUISE push-button.

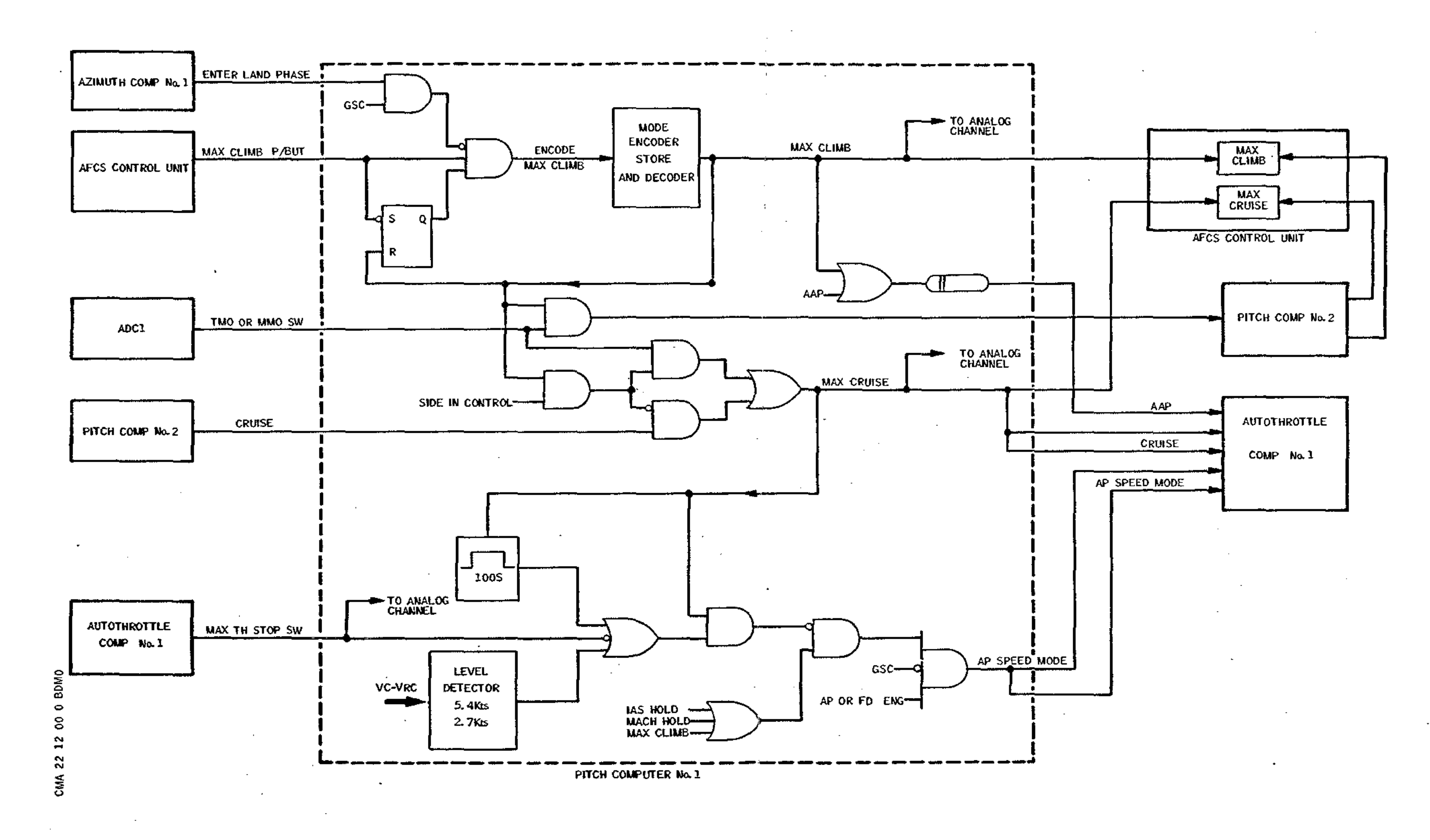
(3) AP IN SPEED MODE logic (Ref. Fig. 016)

This signal is used for automatic autothrottle clutching and declutching.

The autothrottle is clutched when one of the following conditions is present :

- on change-over to MAX CRUISE mode, when the autothrottle is clutched for at least 100 seconds.
- overspeed deviation (IAS - VRC > 5.4 knots) detected by the level switch on the analog channel
- throttle control levers not at maximum electric stop

The autothrottle is declutched when the following



Logic Associated with MAX CLIMB and MAX CRUISE Modes
Figure 016

conditions are present :

- throttle control levers at maximum electric stop and overspeed deviation corrected (IAS - VRC < 2.7 knots)

(4) MAX CLIMB - MAX CRUISE analog channel (Ref. Fig. 017)

The control signal (IAS = VRC) depends on the difference between the indicated airspeed (IAS) and the reference cruising speed (VRC). It is generated by the ADC.

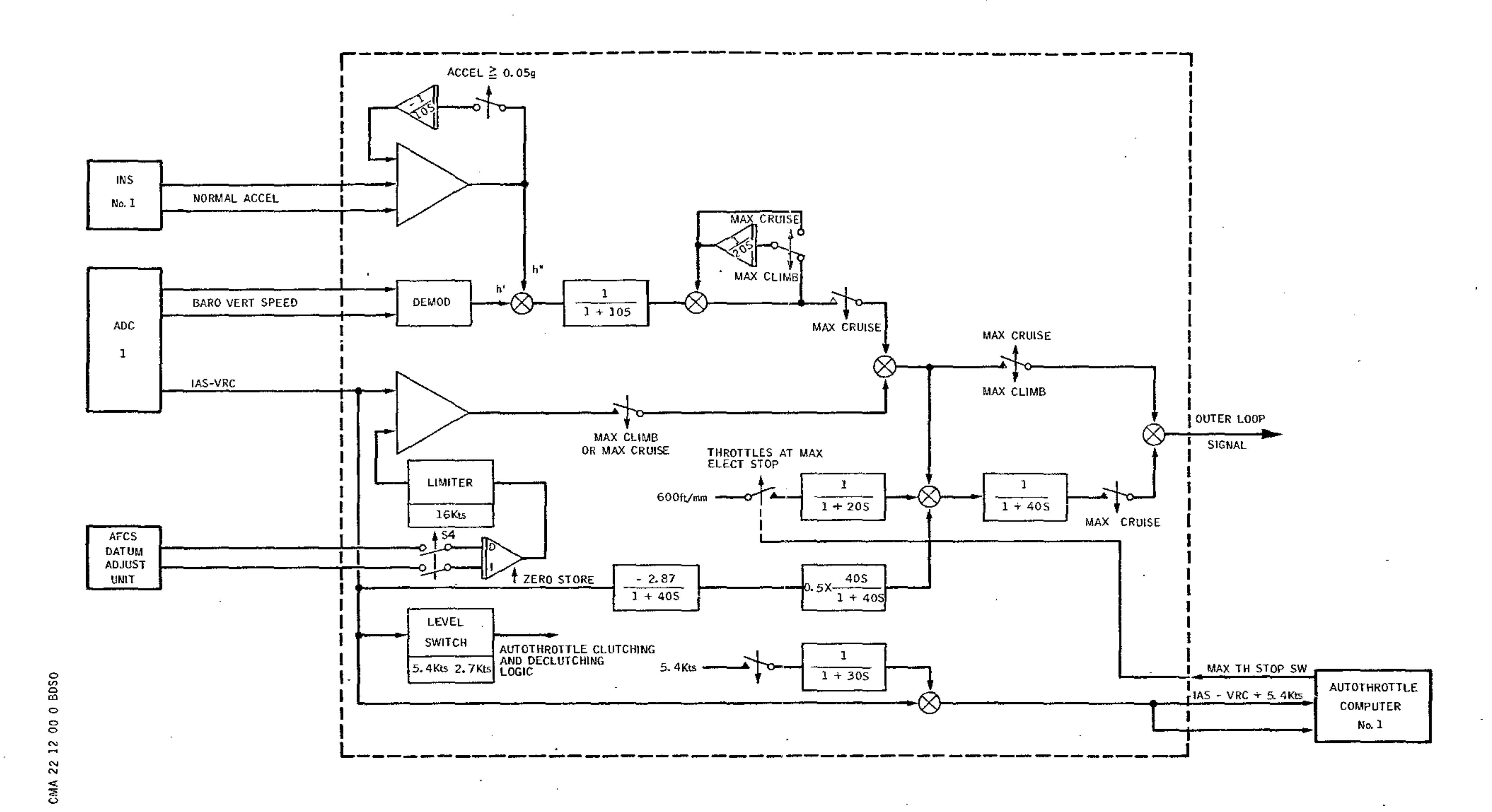
NOTE : This signal, which is used by the AP, is also sent to the autothrottle
A factor (5.4 knots) is added to this term on change-over to CRUISE mode, first passing through a 30 second low pass filter.
This signal is split up to give control and monitoring signals, necessitated by the present structure of the autothrottle.
A hysteresis-type level switch on the control signal line authorizes autothrottle clutching and declutching. This level switch has thresholds at 5.4 knots and 2.7 knots.

The AFCS datum adjust unit can be used in MAX CLIMB mode (maximum adjustment : 16 knots). In MAX CRUISE mode, operation of the NOSE UP - NOSE DOWN switch has no effect. In addition, if an adjustment has been carried out in MAX CLIMB mode, this is cancelled at the digital integrator on automatic change-over to MAX CRUISE mode.

The vertical speed signal received by the MAX CLIMB - MAX CRUISE outer loop is taken into account only in MAX CRUISE mode. This signal is synchronized to avoid jerks on engagement of this mode.

The vertical speed factor of 600 ft. per minute is added when the throttle control levers leave the maximum electric stop . Vertical speed changes are smoothed by the addition of a 20 second low pass filter. The MAX THROTTLE STOP SWITCH logic signal which commands the adddition of the vertical speed factor is generated by the autothrottle.

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MAX CLIMB - MAX CRUISE Outer Loop
Figure 017

F. ALT HOLD Mode

R (1) ALT HOLD Logic (Ref. Fig.014 and 018)

The ALT HOLD mode is coded, stored and decoded to obtain the mode engagement signal in any of the three following cases :

(a) On selection, provided the AP/FD system is not engaged in LAND mode, after GLIDE capture.

(b) When the AP/FD system is engaged in the ALT ACQ mode (AAE) with a difference between selected height and aircraft altitude less than 25 feet. This signal is inhibited by the ALT HOLD signal or the ALT ACQ PRIMED signal. It is also inhibited if the AP/FD system is engaged in LAND mode after GLIDE capture.

(c) When the AP/FD system is engaged in the ALT ACQ mode (AAE), if the pilot selects a new flight level by means of the ALTITUDE SELECT knob (KNOB ROTATE signal), the AP/FD system reverts to PITCH HOLD with ALT ACQ PRIMED (AAP) ; when aircraft height h minus selected height becomes zero and then changes in sign, the AP/FD system engages instantaneously in the ALT HOLD mode.

When the ALT HOLD mode is engaged :

(a) The digital integrator on the outer loop receives a reset pulse.

(b) The ADC resolver associated with this mode is clutched at the electrical zero.

When adjusting by means of the datum adjust unit switch :

(a) A contact, S4, energizes the digital integrator.

(b) The resolver is declutched.

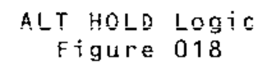
R (2) ALT HOLD Analog Channel (Ref. Fig. 015)

The ALT HOLD ERROR demand signal depends on the discrepancy between the actual aircraft altitude and the altitude existing on engagement of the mode.

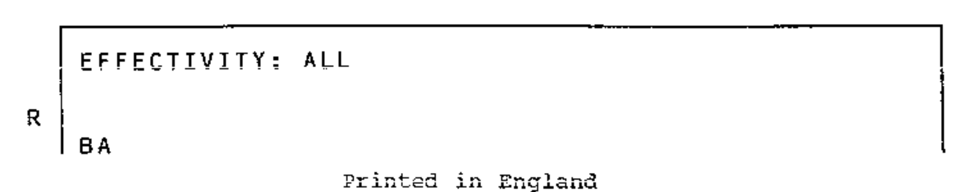
When adjusting, the digital integrator issues a signal to the ALT HOLD channel which is proportional to the

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AFCS DATUM ADJUST UNIT
ALTITUDE SEL SW CONTACTS
KNOB ROTATE
HEIGHT ERROR
REVERT TO ALT HOLD
AAP
PITCH HOLD
AH
AAE
HEIGHT ERROR<25ft
AAP
ENCODE ALT HOLD
CODED MODE STORE
ALT HOLD
ALT HOLD
AFCS CONTROL UNIT
AZIMUTH COMPUTER No 1
ENTER LAND PHASE
GSC
AFCS CONTROL UNIT
ALT HOLD P/BUT
ALT HOLD SELECT
S Q
R



ALT HOLD Logic
Figure 018



EFFECTIVITY: ALL

R

BA

duration of operation of the datum adjust unit NOSE UP - NOSE DOWN switch (Maximum adjustment : ± 600 feet).

When adjustment is achieved, the ALT HOLD analog channel holds the new altitude. The resolver is clutched to the new electrical zero.

G. ALT ACQ Mode

(1) ALT ACQ Logic (Ref. Fig. 019)

The ALT ACQ mode is a capture mode.
On selection, the prime indicator light located below the mode selection push-button will illuminate, confirming selection.
On capture, the mode selection push-button will illuminate, indicating that the mode is active.

(a) ALT ACQ Primed Logic (AAP)

The prime indicator light, located under the ALT ACQ mode selection push-button, illuminates in either of the following cases :

- on selection of the mode.
- on change of flight level, the ALT ACQ mode being engaged.

The prime indicator light extinguishes in any of the following cases :

- on engagement of the ALT ACQ mode (AAE)
- on selection of a basic mode (HDG HOLD or PITCH HOLD).
- on engagement of the GLIDE mode.
- on automatic engagement of ALT HOLD, as the aircraft reaches the selected height (an aural and visual warning is triggered by the altitude alert system) (Ref. 22-11-00, Description and Operation).

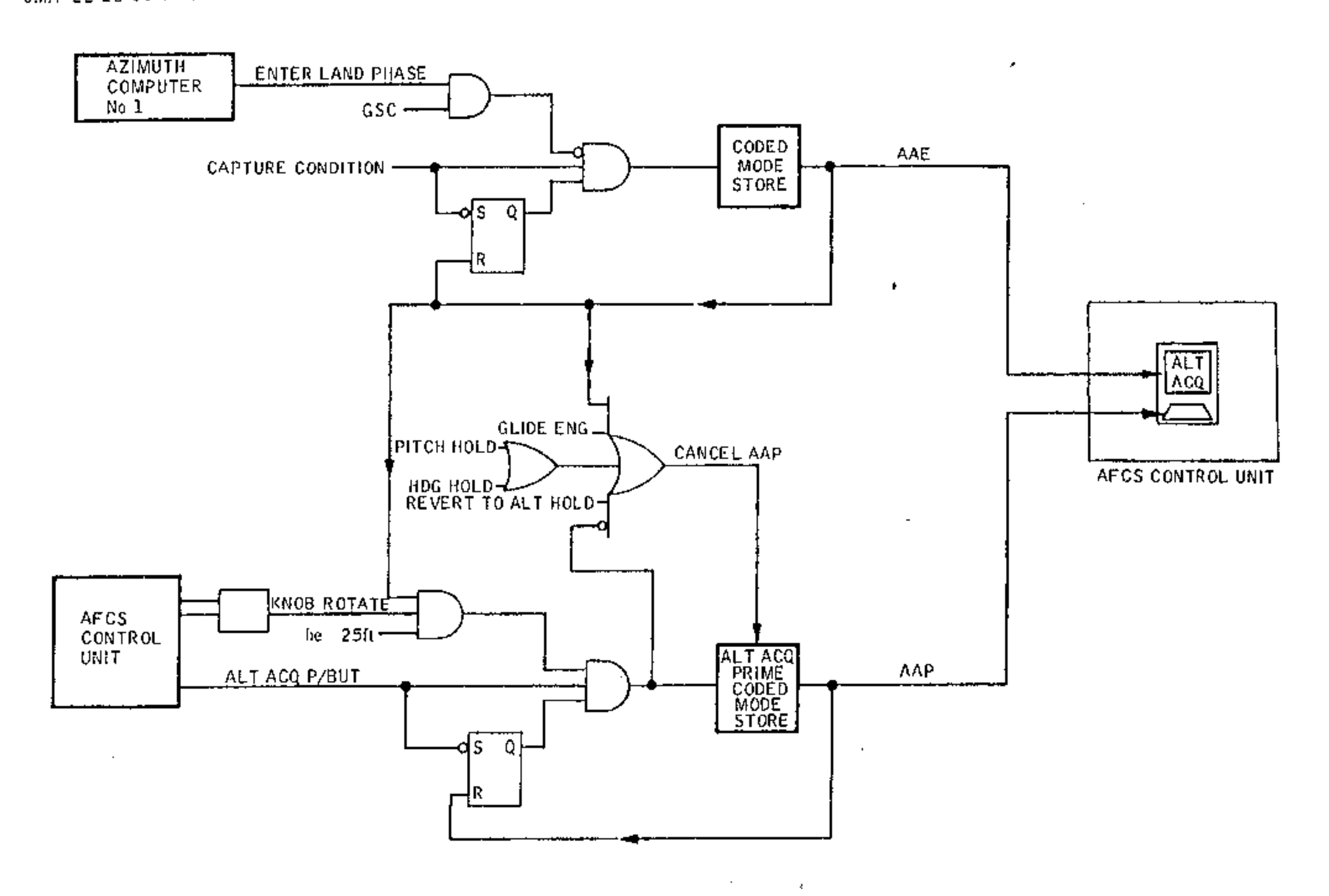
(b) ALT ACQ Logic (AAE)

The ALT ACQ mode engages at capture point provided the AP system is not engaged in the LAND mode, after GLIDE capture.
The capture point depends on the aircraft vertical speed :

- if the aircraft vertical speed is greater than 1000 feet per minute, capture occurs when $he = \frac{h'}{3}$
- if the aircraft vertical speed is lower than 200 feet per minute, capture occurs when $he = \frac{h'}{8}$

The capture point varies linearly between these

CMA 22 12 00 0 BGMO



ALT ACQ Logic
Figure 019

two vertical speed limits.

ALT ACQ mode engagement (AAE) causes the ALT ACQ prime indicator light to extinguish and the previously engaged pitch mode to be cancelled.

NOTE : As soon as the aircraft enters the limits of the selected height (± 25 feet), the ALT HOLD mode engages automatically and cancels the ALT ACQ mode. The aircraft is then controlled in Altitude Hold mode (Ref. ALT HOLD mode).

(2) ALT ACQ Analog Channel (Ref. Fig. 020)

The ALT ACQ ERROR demand signal is issued from the AFCS control unit through two CT synchros (one fine, the other coarse) mechanically linked to the ALTITUDE SELECT knob and electrically connected to the ADC for aircraft height data (corrected for atmospheric pressure by the altimeter) (Ref. 22-10-00, paragraph 3 D).

The signal from the coarse synchro is used on initiation of capture as long as the discrepancy (he) between the actual aircraft height and the selected height is greater than 625 feet.

When this height error is smaller than 625 feet, the demand signal is fed into the fine synchro for improved accuracy, via a level switch located on the analog channel.

The BARO VERT SPEED signal is complementary filtered with NORMAL ACCELERATION to produce complementary filtered height rate, which is used as a damping term.

The level switch activated when he is smaller than 50 feet is used in ALT ACQ mode to remove the BARO VERT SPEED input.

The qD sign sensor is used in conjunction with the he sign sensor to determine the capture point.

The 25 ft level switch indicates when the fine error signal is less than 25 ft and is used in the logic to switch from ALT ACQ mode to ALT HOLD mode.

The 800 ft/min level switch enables variation of the aircraft vertical speed up to this value in the specific case when, the aircraft being in the ALT HOLD

AFCS CONTROL UNIT
ALTITUDE ACQUIRE ERROR COARSE
ALTITUDE ACQUIRE ERROR FINE
DEMOD
DEMOD
$h_e \leq 625$ft LEVEL SWITCH
± 625ft
LOGIC OUTPUT
$h_e \leq 25$ft LEVEL SWITCH
± 25ft
LOGIC OUTPUT
h_e SIGN SENSOR
LOCK OUTPUT
MODULUS GENERATOR
LAG
HEIGHT ERROR VARI GAIN
$h_e < 50$ft LEVEL SWITCH
± 50ft
ALTITUDE ACQUIRE MODE
qD SIGN SENSOR
LOGIC OUTPUT
ALT ACQ ENG
OUTER LOOP DEMAND.
AIR DATA COMPUTER No 1
BAR VERT SPEED
DEMOD
800ft/MIN LEVEL SWITCH
± 800ft/MIN
LOGIC OUTPUT
ALT ACQUIRE AND $h_e < 50$
h'
h"
INS No 1
NORMAL ACCELERATION
DIFF AMP
INT
LAG
ACCEL WASHOUT LOCK-UP
OUTER LOOP

CMA 22 12 00 0 BJMO

ALT ACQ Outer Loop
Figure 020

mode, the pilot selects a new flight level (Ref. VERT SPEED mode).

H. VERT SPEED Mode

(1) VERT SPEED Mode Logic (Ref. Fig. 021)

(a) If the AP/FD is not engaged in LAND mode after GLIDE capture, the VERT SPEED mode engages in either of the following cases :

(a1) On selection of the mode.

(a2) Automatically when, the AP/FD system being engaged in the ALT HOLD mode, the pilot selects the ALT ACQ mode to obtain a flight level change. Then the AP system controls the change in aircraft altitude until a vertical speed of 800 ft/min is reached. The AP/FD system holds this vertical speed until the capture phase is initiated and then reverts to the ALT ACQ mode.

To this end :

The VERT SPEED ROTATE signal becomes active on automatic engagement of the VERT SPEED mode. The Outer Loop signal is inhibited ; another signal is generated for attitude variation demand.
This signal remains active as long as the aircraft vertical speed does not reach 800 ft/min. At 800 ft/min vertical speed, it is inhibited and the RJ inner loop receives the outer loop VERT SPEED signal.

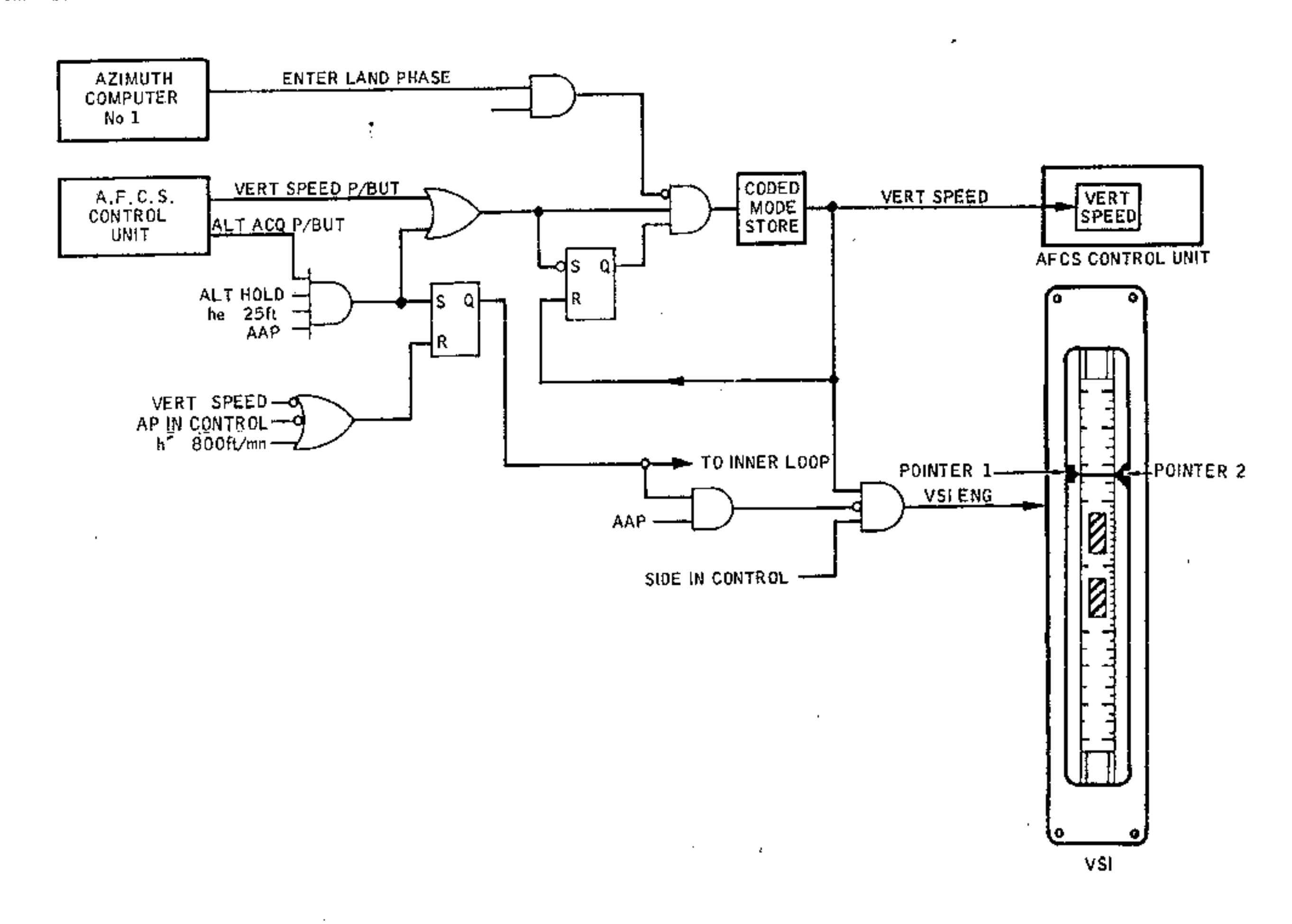
(b) The VSI ENG (+ 28 VDC) signal, which is present when the VERT SPEED mode is engaged (cancelled during change in aircraft attitude) is transmitted to the vertical speed amplifier, provided the associated side is in control. This signal :

(b1) Disconnects pointer 1 from its control motor.

(b2) Cancels synchronization between the two pointers and makes it possible to control the pointer by means of the datum adjust unit NOSE UP - NOSE DOWN switch.

When the pilot acts on the datum adjust unit switch, pointer 1 is clutched to its control motor which receives the demands from the datum adjust unit (Ref. 22-10-00, paragraph 3.L).

CMA 22 12 00 0 BLMO



VERT SPEED Mode Logic
Figure 021

EFFECTIVITY: ALL

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(2) Analog Channel

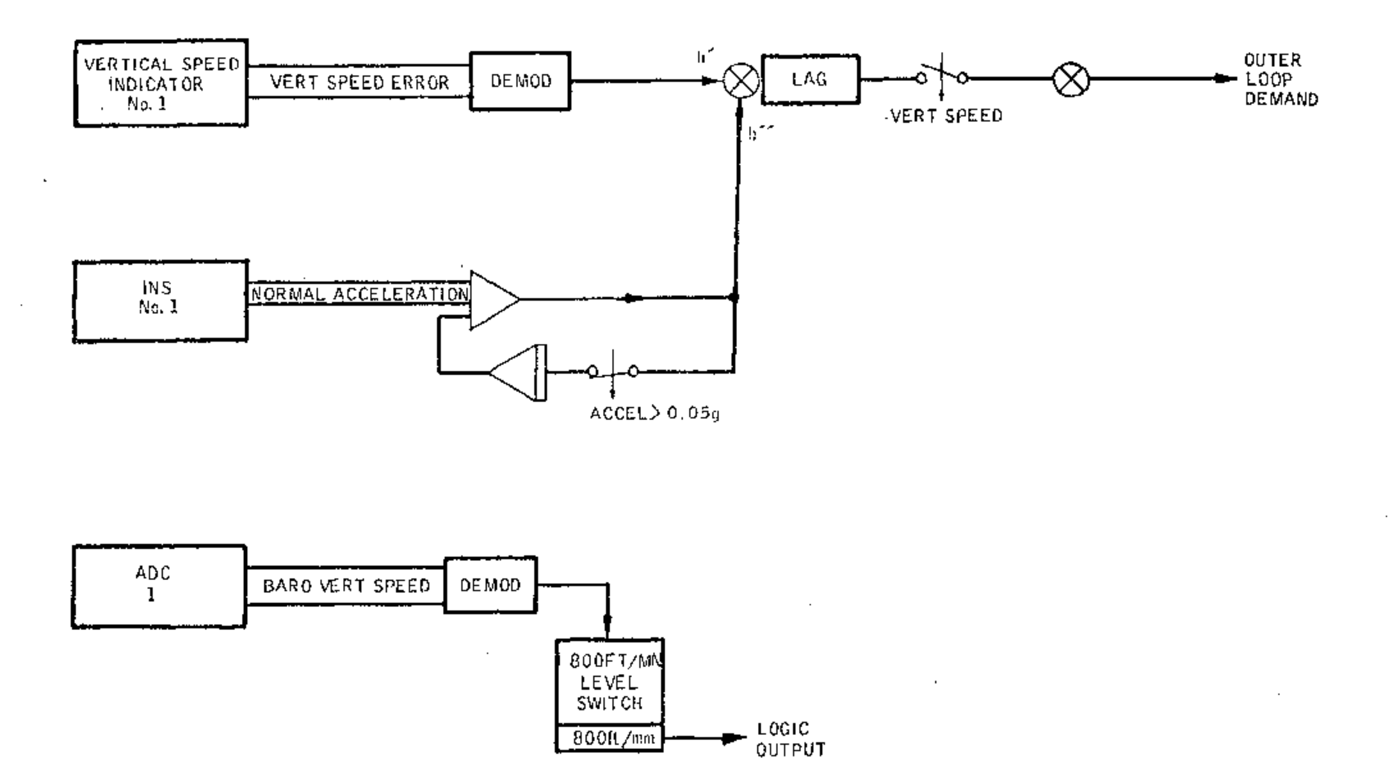
(a) VERT SPEED Outer Loop (Ref. Fig. 022)

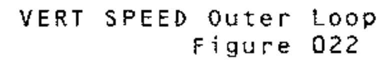
The VERT SPEED ERROR demand signal is the difference between the vertical speed selected at the time of engagement of this mode and the true aircraft vertical speed.
It is issued by the vertical speed indicator and corresponds to the discrepancy between the two pointers.
Pointer 1 is locked on the vertical speed existing at the time of engagement, pointer 2 varies with the true speed indicated by the ADC.
When (true) vertical speed varies, pointer 2 moves, which results in a gap between the two pointers and therefore in a signal issued to the AP/FD channel. The AP/FD controls the aircraft to reset the pointer to the initial vertical speed. Pointer 2 moves towards pointer 1 and the error signal decreases to become zero when the two pointers are facing each other. On selection of a new vertical speed by means of the datum adjust unit NOSE UP - NOSE DOWN switch, pointer 1 moves and therefore generates an error signal. The AP/FD system controls the aircraft to reset pointer 2 (true vertical speed) to this new commanded vertical speed and at the end of operation, pointer 2 and pointer 1 are facing each other.

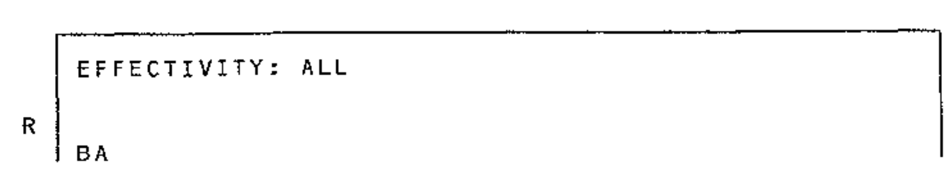
The VERT SPEED ERROR signal is damped with the washed out normal acceleration signal.

The 800 ft/min level switch allows variation of the aircraft vertical speed up to that value.

CMA 22 12 00 0 BNMO




VERT SPEED Outer Loop
Figure 022


EFFECTIVITY: ALL

R

BA

I. GLIDE Mode

(1) GLIDE Mode Logic

(a) GLIDE PRIMED Logic (GP)

On selection of the GLIDE mode, or of the LAND mode, the GLIDE prime indicator light illuminates, confirming GLIDE mode selection.

The GLIDE prime indicator light extinguishes in either of the following cases :

- on GLIDE capture
- on selection of the PITCH HOLD mode, or HDG HOLD mode, with LAND mode primed (LP).

(b) GLIDE Logic (Glide Slope Capture - GSC)

The GLIDE mode engages at capture point.

The capture point varies with aircraft vertical speed h', GLIDE beam sensitivity and the preset value of the nose-down demand to avoid nose up movement of the aircraft at the beam capture point.

The capture sensor is located in the GLIDE analog channel.

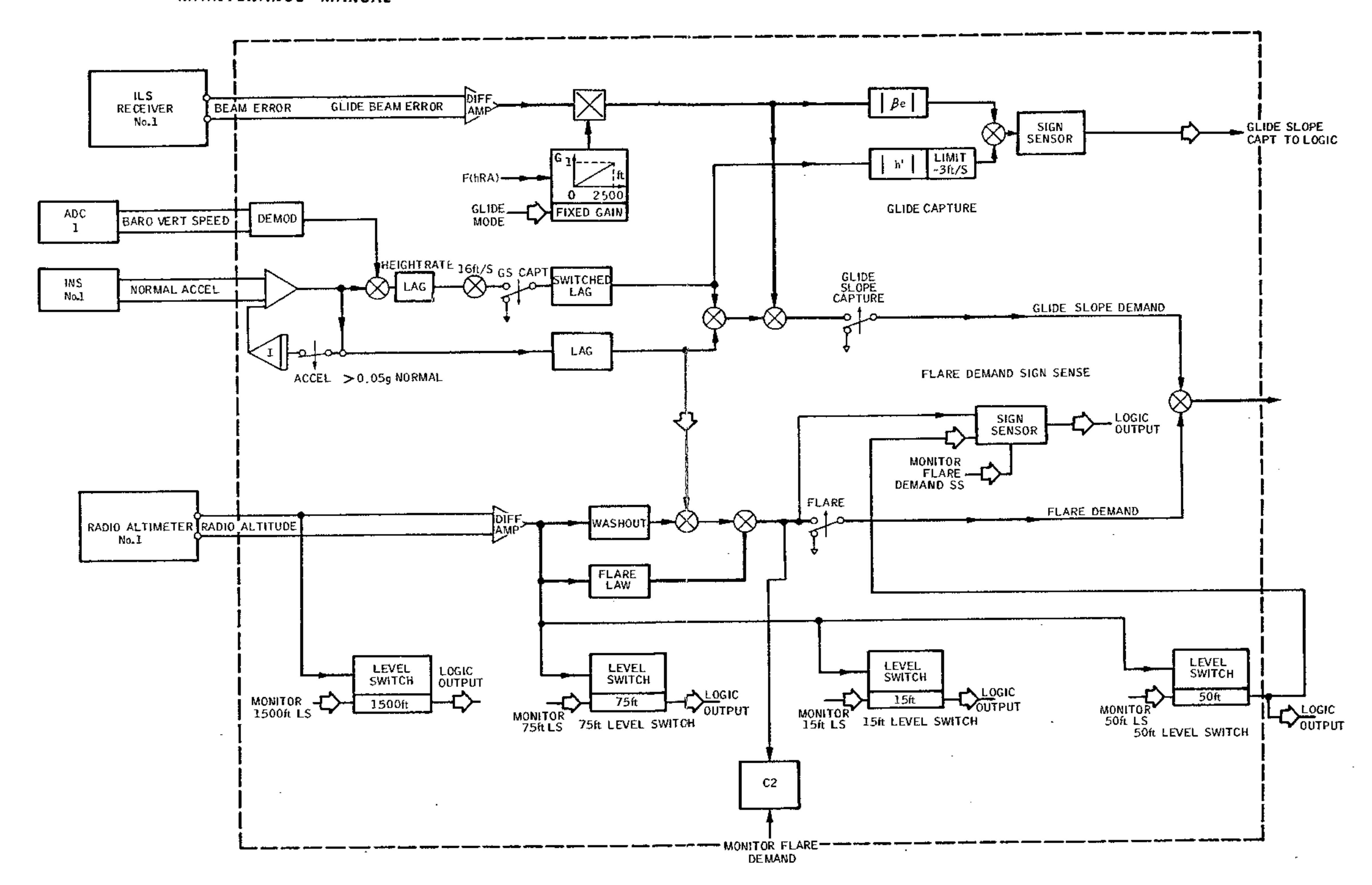
(2) GLIDE Analog Channel
(Ref. Fig. 023)

The GLIDE BEAM ERROR demand signal is issued by the ILS receiver ; its gain is constant.

The GLIDE SLOPE demand signal is produced from the GLIDE BEAM ERROR and complementary filtered height rate, the demand being switched into the outer loop at GLIDE capture, when the demand should be zero. An offset is injected into the height rate to produce zero output.

A logic output (GLIDE SLOPE CAPT) is generated when the modulus of beam error is less than the modulus of height rate. A limit of 3 ft/sec. is incorporated in the height rate modulus generator to allow for capture when flying parallel to the beam.

At 75 ft. (radio altitude) the GLIDE signal is interrupted and the AP ensures vertical speed holding.



CMA 22 12 00 0 BQSO

GLIDE and FLARE Outer Loop
Figure 023

J. LAND Mode

(1) LAND Mode Logic

(a) LAND PRIMED Logic (LP)

On selection of LAND mode, the LAND prime indicator light illuminates, confirming selection. LAND mode selection causes VOR/LOC and GLIDE prime indicator lights to illuminate.

The LAND prime indicator light extinguishes in either of the following cases :

- After GLIDE capture and LOC TRACK (GSC and LOC TRACK).
- On selection of a basic mode (HDG HOLD or PITCH HOLD).

(b) LAND Logic

The LAND mode engages after LAND TRACK, i.e. after GSC and LOC TRACK. The LAND mode selection push-button illuminates. It is the only selection push-button illuminated on the AFCS control unit. It disengages when the pilot initiates a GO AROUND manoeuvre.

NOTE : The LAND mode logic circuit is dealt with in 22-13-00, Description and Operation, paragraph 5.G.

R (2) LAND Analog Channel (Ref. Fig. 023)

The LAND mode demand signal used in the pitch channel is identical to the GLIDE mode demand signal, but gains vary with the radio altimeter altitude.

In LAND mode, the flare phase is performed with the AP/FD system in control.
The flare phase is initiated when radio altitude is lower than 50 feet and when the flare function vertical speed is greater than the aircraft vertical speed.
The AP/FD system ensures an asymptotic path until touch down.

NOTE : In LAND mode, a START PROGRAMMED THROTTLE CLOSURE logic signal is transmitted to the auto-throttle system which initiates an automatic throttling down. The throttle control levers move to the flight idle position at a rate of 4

degrees per second. This phase is initiated at an altitude lower than 15 feet.

K. GO AROUND Mode

(1) GO AROUND Mode Logic

Unlike the other modes, the GO AROUND mode cannot be selected.
It engages automatically if the three following conditions are met :

- After Glide Slope Capture and LOC Track in GLIDE mode or in LAND mode.
- Neither autothrottle lane engaged.
- At least two throttle control levers in max thrust position.

If the three above mentioned conditions are met, the GO AROUND caption light illuminates.

(2) GO AROUND Analog Channel (Ref. Fig. 013)

The aircraft is controlled in a mode identical to PITCH HOLD mode.
The GO AROUND function ensures a change in aircraft pitch attitude until a pre-set value of 15° is obtained.
R B Both A/P's may be engaged in the GO-AROUND
R B mode until a basic mode is re-selected and
R B A/P2 will automatically disengage.

AUTOPILOT - SPLIT MODES -

If Autopilot is reported stuck in Pitch Hold, the basic initial engagement mode, then the following procedure must be carried out :

A. Pull circuit breaker for No 1 A/P, engage No 2 and check for satisfactory engagement.

B. Pull circuit breaker for No 2 A/P, engage No 1 and check for satisfactory engagement.

C. Change pitch computers for whichever autopilot remains stuck in an autopilot mode

PITCH CHANNEL - ADJUSTMENT/TEST

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

1. General

WARNING : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

The pitch channel operational test includes :
- Test of AP/FD pitch computers by means of the ITEM system.
- Check of AP engagement, FD engagement, and AP warning.
- Check of AFCS datum adjust unit AUTOPILOT NOSE UP - NOSE DOWN switch.
- Check of pitch mode selection.
  For pitch mode functional Test, refer to 22-10-00, Adjustment/Test.

2. Operational Test

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.47 metres (14 ft. 8 in.)	

B. Prepare

(1) Check that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
NOSE UC WEIGHT SW "A" SYS SUP	1-213	G 291	M16
LH UC WEIGHT SW "A" SYS SUP		G 292	M17
RH UC WEIGHT SW & DOWNLOCK "A" SYS SUP		G 295	M18
FD1/FD2 1ST PLT SW SUP		1C 27	Q13
AFCS TEST 1 28V SUP		1C 383	R12
1ST PLT ADC INST SUP	2-213	1F 75	B3
ADC 1 26V SUP		1F 78	A2
LH UC WEIGHT SW & DOWNLOCK "B" SYS SUP	3-213	G 293	B8
RH UC WEIGHT SW "B" SYS SUP		G 294	B9
NOSE UC WEIGHT SW "B" SUP		G 296	D8
FD1/FD2 2ND PLT SW SUP	5-213	2C 27	A13
AFCS TEST 2 28V SUP		2C 383	F11
AFCS TEST 1 115V SUP	13-215	1C 384	D6
2ND PLT ADC INST SUP	13-216	2F 75	A14
ADC 2 26V SUP		2F 78	F14
AFCS TEST 2 115V SUP		2C 384	F17

(2) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(3) At Flight Engineer's station, on EQUIPMENT BAY COOLING unit, make certain that electronics rack ventilation is operating (Ref. 21-21-00).

(4) Set flight controls in Blue or Green electrical mode (Ref. 27-00-00, Servicing).

(5) Carry out work preparation required for engagement of both APs and both FDs (Ref. 22-10-00, Servicing).

R (6) The aircraft must be on the ground, shock absorbers
R compressed.

R B WARNING : DO NOT ENGAGE AN AUTOPILOT WHEN AIRCRAFT IS
R B ON JACKS.

(7) Make certain that FD1/FD2 switches are in FD1 position on Captain's instrument panel and in FD2 position on First Officer's instrument panel.

(8) On Captain's Attitude Director Indicator (ADI), check that FD flag (red) does not mask FD1 marker.

(9) On First Officer's Attitude Director Indicator (ADI), check that FD flag does not mask FD2 marker.

C. Test of AP/FD pitch computers by means of the ITEM system

NOTE : Test procedure being identical for each computer, only computer No. 1 Test is described while information relating to computer No.2 is given in parentheses.

(1) At Flight Engineer's station, on ITEM control and indicator panel :

(a) Place side 1 (side 2) IFM-OFF-TEST selector switch in TEST position (this switch is of the pull-to-unlock type).

(b) Place FLIGHT-TEST ALL-TEST UNIT selector switch in TEST UNIT position.

(b1) ITEM indication must appear in window 3 (7) and TEST indication in window 4 (8).

(b2) ITEM system automatic test is then initiated and 2 minutes 30 secondes later approximately, readings must be :
- ITEM in window 3 (7)
- PASS in window 4 (8)

NOTE : If ITEM self test is ineffective, readings will be :
- ITEM in window 3 (7)
- FAIL in window 4 (8)
In such case, the test of AP/FD pitch computer No.1 (No.2) cannot be carried out.

R (c) Place and hold side 1 (side 2) SELECT-START switch in SELECT position. Then release it when AP.P indication appears in window 3 (7).

NOTE : AFCS indications appear in the following sequence :
SFC, AP.P, AP.A, AT, AS.P, AS.R, AS.Y, ET, WLD in window 3 (7).

(d) Place side 1 (side 2) SELECT-START switch in START position then release it.

(d1) AP/FD pitch computer No.1 (No.2) test is initiated, the following indications must appear :
- AP.P in window 3 (7)
- TEST in window 4 (8).

(d2) And approximately 1 minute 30 seconds later :
- AP.P in window 3 (7)
- PASS in window 4 (8).

NOTE : If computer test is ineffective, indications will be :
- AP.P in window 3 (7)
- COMP or LAND in window 4 (8).

(e) Place side 1 (side 2) IFM-OFF-TEST selector switch in OFF position.

(e1) Check that indications disappear from windows 3 and 4 (7 and 8).

(f) Place FLIGHT-TEST ALL-TEST UNIT selector switch in FLIGHT position.

D. Check of AP engagement, FD engagement, and AP warning

(1) On ADC control panel, place ADC1 selector switch in TEST 2 position, ADC2 selector switch in TEST 2 position and, when data is stabilized, press ADC1 and
R ADC2 warning lights. Re-engage systems which have disengaged (Trim and Autostabilizer).

(2) On AFCS control unit, engage FD1 switch.

(a) The switch must remain engaged.

(b) PITCH HOLD mode selection push-button must illuminate.

(c) On Captain's ADI, the pitch control bar must be
R centred. FD flag disappears and FD1 marker is
R apparent.

(3) Engage FD2 switch.

(a) The switch must remain engaged.

(b) On First Officer's ADI, the pitch control bar
R must appear and be centred. FD flag disappears and
R FD2 marker is apparent.

(4) Engage AP1 switch.

(a) HDG HOLD mode selection push-button must illuminate (PITCH HOLD is already illuminated).

(b) AP1 caption light must illuminate.

(c) The pitch bars, must disappear from both ADIs.

(d) Check that there is no significant displacement of control column.

(5) Engage AP2 switch.

(a) The switch must remain engaged.

(b) AP2 caption light must illuminate.

(c) AP1 switch must disengage.

(d) AP1 caption light must extinguish.

(e) Check that there is no significant displacement of control column.

(6) On Captain's and First Officer's VOR-ILS-DME control
R units, display an ILS frequency (108.1 MHz for example

(7) On AFCS control unit, select LAND mode.

(a) The prime indicator lights under LAND, GLIDE, and VOR/LOC push-buttons must illuminate.

(8) Engage AP1 switch.

(a) The switch must remain engaged.

(b) AP1 caption light must illuminate.

(c) AP2 switch must remain engaged.

(9) On Captain's control column, press then release AP DISC switch.

(a) AP1 and AP2 switches must disengage.

(b) AP1 and AP2 caption lights must extinguish.

(c) HDG HOLD push-button must extinguish (PITCH HOLD push-button remains illuminated).

(d) The pitch bars must appear on both ADIs.

(e) On both W & LD indicators, AP red warning lights must illuminate.

(f) The cavalry charge aural warning must sound during 1 second.

(10) On Captain's W & LD indicator, press AP red warning light.

(a) Both AP warning lights must extinguish.

(11) Manually disengage FD1 and FD2 switches.

(a) PITCH HOLD selection push-button must extinguish.

(b) The pitch bars must disappear from both ADIs.

R E. Check of AFCS Datum Adjust Unit AUTOPILOT NOSE UP-NOSE DOWN Switch

(1) On AFCS control unit, engage AP1 switch.

R (a) Switch must remain engaged.

(b) PITCH HOLD and HDG HOLD push-buttons must illuminate.

(c) AP1 caption light must illuminate.

(d) Check that there is no significant displacement of control column.

(2) On AFCS datum adjust unit, place then hold AUTOPILOT NOSE UP-NOSE DOWN switch in NOSE UP position.

(a) Trim control wheel must rotate in nose up sense.

(b) Both control columns must move rearwards.

(c) Elevons must deflect upwards (check on ICOVOL indicator).

R (3) Hold AUTOPILOT NOSE UP-NOSE DOWN switch in NOSE DOWN position to set elevons to neutral position.

(4) Engage AP2 switch.

(a) AP1 switch must disengage.

(5) Repeat check of AUTOPILOT NOSE UP-NOSE DOWN switch, using AP2 switch.

(a) Results must be identical.

R (6) On First Officer's control column handwheel, press then release AP DISC push-button.

(a) AP2 switch must disengage.

R
R (b) AP warning light must illuminate on both warning and landing display indicators.

(c) Cavalry charge aural warning must sound for one second.

(7) Press AP DISC push-button.

(a) Both AP red warning lights must extinguish.

F. Check of Pitch Mode Selection

(1) On AFCS control unit, engage FD1 switch.

(a) Switch must remain engaged.

(b) PITCH HOLD push-button must illuminate.

(2) Successively select MACH HOLD, IAS HOLD, ALT HOLD, VERT SPEED and MAX CLIMB modes.

(a) At each selection, check that associated push-button illuminates while previously illuminated push-button extinguishes.

(3) MAX CLIMB push-button being illuminated, press MAX CRUISE push-button.

(a) MAX CRUISE push-button must remain extinguished.

(4) Select ALT ACQ mode.

(a) ALT ACQ prime indicator light must illuminate.

(5) Select PITCH HOLD mode.

(a) ALT ACQ prime indicator light must extinguish.

(b) MAX CLIMB push-button must extinguish.

(c) PITCH HOLD push-button must illuminate.

(6) Select GLIDE mode.

(a) VOR/LOC and GLIDE prime indicator lights must illuminate.

(7) Select PITCH HOLD mode.

(a) GLIDE and VOR/LOC prime indicator lights must extinguish.

(8) Disengage FD1 switch.

(a) PITCH HOLD push-button must extinguish.

G. Close-Up

(1) Carry out close-up required for engagement of both APs and both FDs (Ref. 22-10-00, Servicing).

(2) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

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PITCH COMPUTER - REMOVAL/INSTALLATION

1. General

CAUTION : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN CHAPTER 22-00-00, SERVICING.

Pitch AP/FD computers 1C12 and 2C12 are respectively mounted on shelves 4-215 and 4-216 of electronics rack. Locating pins are provided on connectors so that computer replacement with a computer of a different type is made impossible.

Removal procedures for replacement of the computers are identical, only one procedure is described.
Only circuit breakers associated with the computer to be removed must be tripped.

2. Computer

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.47 meters (14 ft. 8 in.)	
Circuit Breaker Safety Clips	

B. Prepare

(1) For removal of computer No.1 (1C12), trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AP/FD SYS 1 CONT	1-213	1C 17	Q13
AP/FD SYS 1 SUP	2-213	1C 20	C 5
AP/FD COMP 1 SUP	13-215	1C 18	A 5
AFCS MODE SYS 1 LTS SUP		1C 273	B 5

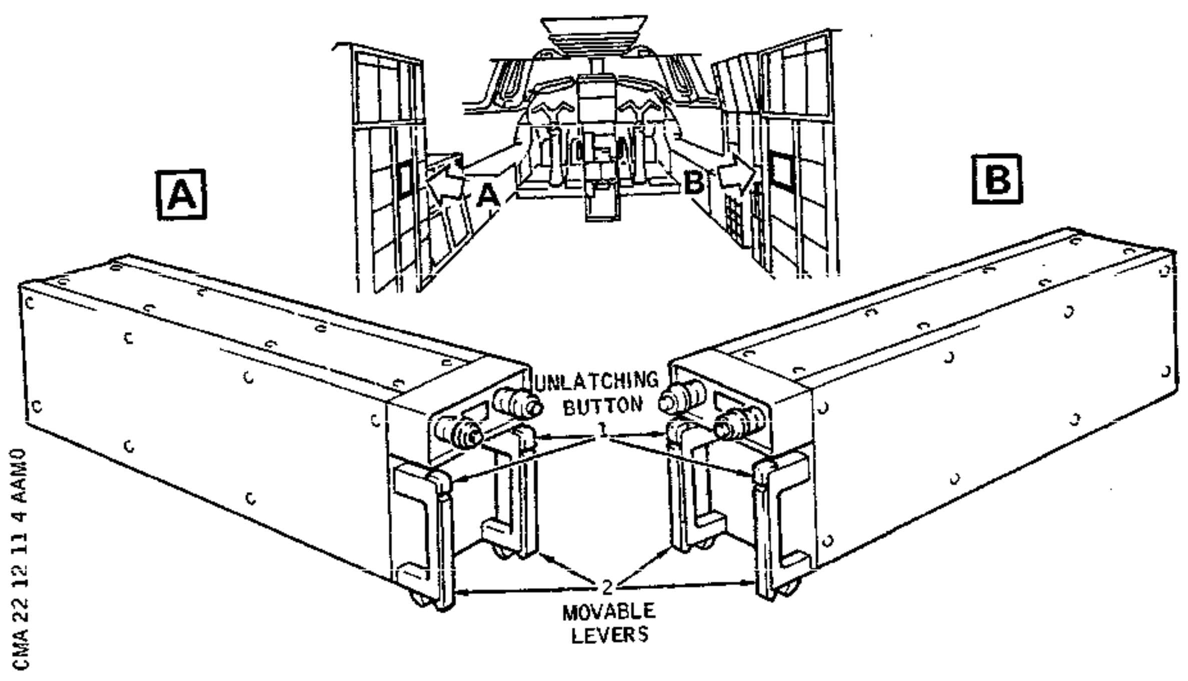
(2) For removal of computer No.2 (2C12), trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AP/FD SYS 2 CONT	5-213	2C 17	A11
AP/FD SYS 2 SUP	13-216	2C 20	A17
AFCS MODE SYS 2 LTS SUP		2C 273	E17
AP/FD COMP 2 SUP		2C 18	F18

R (3) Remove panel 215BS to gain access to shelf 4-215 for
R removal of computer No.1 (1C 12) or panel 216BS for
R removal of computer No.2 (2C 12).

C. Remove





Location of Pitch AP/FD Computers
Figure 401

(1) On front face of computer, press unlatching button (1) on top of the two pulling handles.

(a) The two movable levers (2) fall.

(2) Fully lower the two movable levers.

(3) Withdraw computer by pulling the handles.

D. Preparation of Replacement Component

(1) Check that computer seating is clean and that rack connectors are in correct condition (no corrosion).

(2) Visually check pitch computer for correct external condition (no dents) and check that connectors are undamaged and free from traces of corrosion.

E. Install

(1) Press the two unlatching buttons.

(a) The two movable levers fall.

(2) Position computer on its rails.

(3) Push computer fully home.

(4) Lift the two movable levers until pawls lock into position.

(5) Remove safety clips and tags and reset the circuit breakers previously tripped.

F. Tests (Ref. 22-12-11, Adjustment/Test)

G. Close-Up

R (1) Install panel 215BS or 216BS.

(2) Remove access platform.

PITCH COMPUTER - ADJUSTMENT/TEST

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

1. General

WARNING : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

Test procedure being identical for each computer, only computer No.1 (Captain's side) test is described, while information relating to computer No.2 (First Officer's side) is given in parentheses.
Nork preparation is, however, common to both computers.

2. Operational Test

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.47 m (14 ft. 18 in.)	

R ### B. Prepare

R B WARNING : DO NOT ENGAGE AN AUTOPILOT WHEN THE AIRCRAFT
R B IS ON JACKS.

(1) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(2) At Flight Engineer's station, on EQUIPMENT BAY COOLING panel, make certain that electronics rack ventilation is operating (Ref. 21-21-00).

(3) Set flight control system in Blue or Green electrical mode (Ref. 27-00-00, Servicing).

(4) Carry out work preparation required for engagement of both APs (Ref. 22-10-00, Servicing).

C. Tests

(1) On AFCS control unit, engage AP1 (AP2) switch.

(a) This switch must remain engaged.

(b) On AFCS control unit.

(b1) AP1 (AP2) indicator light must illuminate.

(b2) PITCH HOLD and HDG HOLD push-buttons must illuminate.

(c) Check that the control column displacement is not significant.

(2) When the control column stops, on centre console, on AFCS datum adjust unit, move NOSE DOWN-NOSE UP switch in NOSE UP direction at slow variation rate (first position).

(a) Control column moves backwards.

(b) Pitch trim control wheel rotates in nose up direction.

(c) Elevons deflect upwards (check on ICOVOL indicator).

(3) Move NOSE DOWN-NOSE UP switch in NOSE DOWN direction (slow deviation rate, first position).

(a) Control column moves forwards.

(b) Pitch trim control wheel rotates in nose down direction.

(c) Elevons deflect downwards.

(4) On Captain's (First Officer's) control handwheel, press then release AP DISC push-button.

(a) AP1 (AP2) switch disengages

(b) AP1 (AP2) indicator light extinguishes.

(c) HDG HOLD and PITCH HOLD push-buttons extinguish.

(d) AP warnings must illuminate on both warning and landing display indicators.

(e) Cavalry charge aural warning sounds for one second

(5) On First Officer's control column, press then release AP DISC push-button.

(a) AP warnings are cancelled.

D. Close-Up

(1) Carry out close-up required for engagement of both APs (Ref. 22-10-00, Servicing).

(2) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

RELAY JACK SENSOR - REMOVAL/INSTALLATION

1. General

WARNING : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

R Relay jack sensor C3 is installed on the relay jack chassis and
R its input lever is driven by the pitch relay jack.

2. Relay Jack Sensor

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.470 m (14 ft. 8 in.)	
Access Platform 2.960 m (9 ft. 8 in.) R	
Warning Notice	
Circuit Breaker Safety Clips	
R Blanking Caps	
Stainless Steel Cotter Pin	
R Lockwire - Dia. 0.8 mm (0.032 in.) Corrosion Resistant Steel	

B. Prepare

WARNING : DISPLAY WARNING NOTICES ON ENGINES 1, 2 AND 3 PROHIBITING PRESSURIZATION OF BLUE, GREEN AND YELLOW HYDRAULIC SYSTEMS BY HYDRAULIC GROUND POWER UNIT.

DISPLAY A WARNING NOTICE AT FLIGHT ENGINEER'S STATION PROHIBITING USE OF GROUND PRESSURIZING SYSTEM ELECTRIC PUMPS.

WARNING : DISPLAY A WARNING NOTICE IN FLIGHT COMPARTMENT PROHIBITING OPERATION OF FLIGHT CONTROLS.

(1) Trip, safety and tag the following circuit breakers.

(a) Pitch axis

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
LAT ACCELMTR 1 26 V SUP	2-213	1C 42	A 4
LAT ACCELMTR 2 26 V SUP	13-216	2C 42	B16

C. Remove

(1) At Flight Engineer's station, remove floor panel 213DF providing access to pitch axis relay jack sensor C3.

R (2) Disconnect the two electrical plug connectors (1) from
R receptacles A and B, identify them.

R (3) Install blanking caps on receptacles A and B.

(4) Open access door 121FB and disconnect relay jack link rod (7) from input lever (9) of relay jack sensor (10) to be removed.

(5) Proceed as follows :

(a) Remove cotter pin (3).

(b) Remove nut (4).

(c) Remove and retain washer (5) and special washer (6).

(d) Remove pip pin (8).

(6) Cut and remove lockwire from the two attachment screws (2).

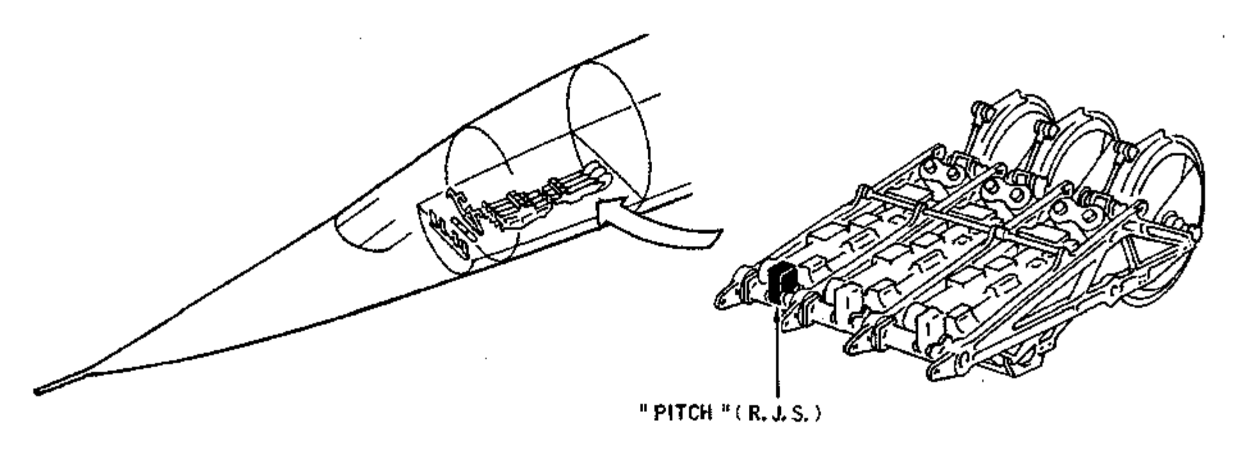
(7) Remove the two attachment screws while holding relay jack sensor (10).

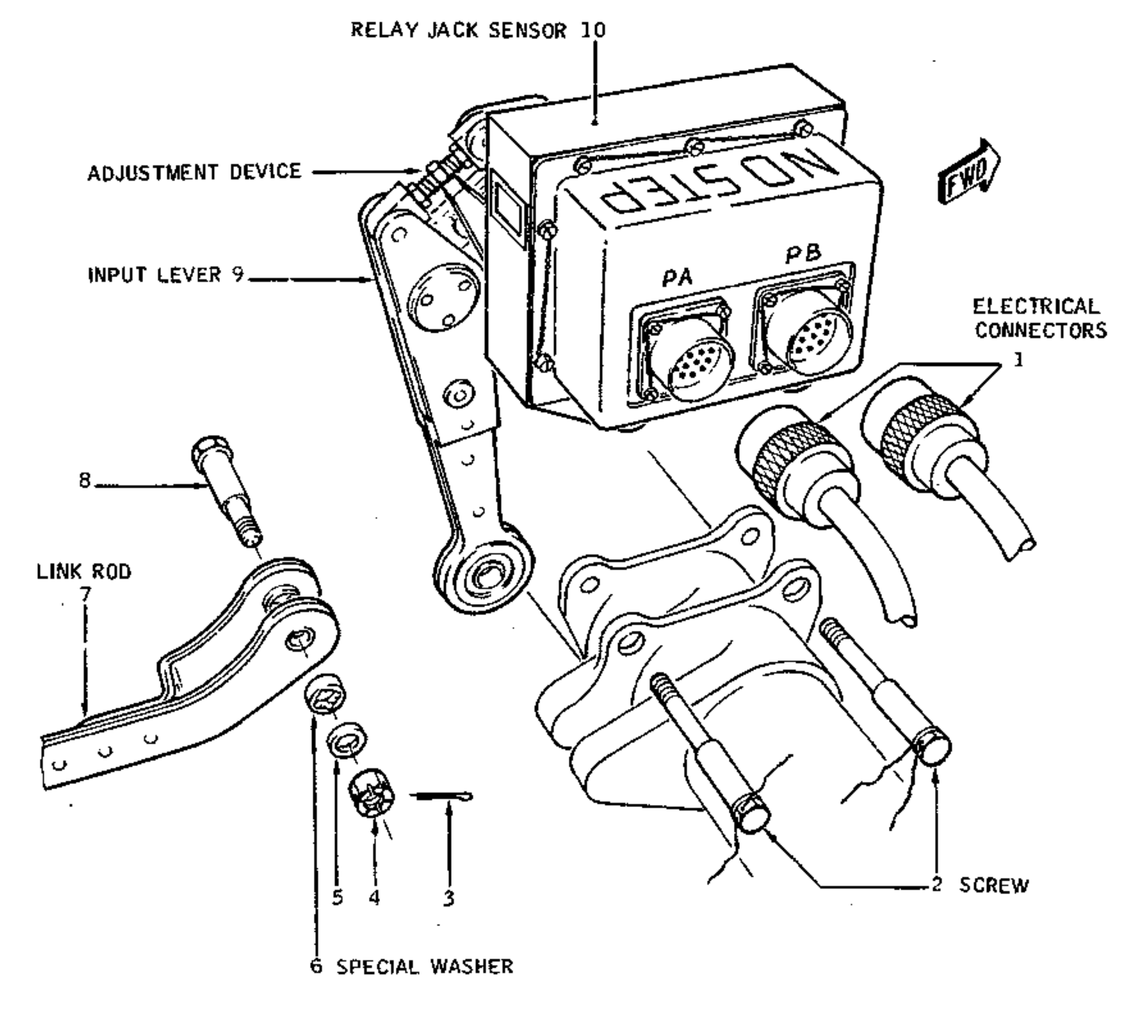
(8) Remove relay jack sensor (10).

D. Preparation of Replacement Component

(1) Remove relay jack sensor input lever handling equipment and install it on removed relay jack sensor.

(2) Visually check relay jack sensor for evidence of
R corrosion and dents ; in particular check that input





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Installation of Relay Jack Sensor
Figure 401

lever and electrical connectors are not damaged.

E. Install

(1) Position relay jack sensor (10).

(2) Tighten the two attachment screws (2).

(3) Through access door 121FB, position and connect link rod (7) to the input lever (9) of relay jack sensor.

(4) Proceed as follows :

R (a) Push pip pin (8) fully home.

(b) Install special washer (6).

(c) Install washer (5).

(d) Tighten nut (4).
R Torque to between 12 and 15 lbf.in. (0.135 and 0.170 m.daN).

(e) Safety with cotter pin.

(5) Wirelock the two attachment screws (2).

R (6) Remove blanking caps from receptacles A and B.

R (7) Connect the two electrical plug connectors (1) to
R receptacles A and B.

(8) Remove safety clips and tags and reset circuit breakers.

(9) Remove warning notices.

F. Test

(Ref. Adjustment/Test)

G. Close-Up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2) Install and secure floor panel 213EF, and close access door 121FB.

(3) Remove access platforms.

RELAY JACK SENSOR - ADJUSTMENT/TEST

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

1. General

WARNING : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

The purpose of the following test procedure is to check that there is no discrepancy between the pitch relay jack position and the monitored position of the associated relay jack sensor (RJS) resolvers. These resolvers issue AC position feedback signals to AP/FD pitch computers 1 and 2.

This procedure is carried out with the aircraft on the ground, and can be performed in two ways :

A. Check by measuring voltage on front face of AP/FD pitch computers.

B. Check by measuring angle on pitch RJS by means of a test set.

2. Check by Measuring Voltage on Front Face of AP/FD Computer

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.440 m (14 ft 8 in)	-
Access Platform 2.960 m (9 ft 8 in)	-
Electrical Ground Power Unit	-
Rigging Pin-Synchro Pack - Pitch	D925252003
Multimeter	-

RB

B. Prepare

(1) Make certain that the following circuit breakers are set:

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AP/FD SYS 1 CONT	1-213	1C 17	Q13
FLT CONT POSN IND CONT		C 83	R11
LAT ACCELMTR 1 26V SUP	2-213	1C 42	A 4
FLT CONT POSN IND 26V 400HZ SUP		C 84	B 4
AP/FD SYS 1 SUP		1C 20	C 5
AP/FD SYS 2 CONT	5-213	2C 17	A11
AP/FD COMP 1 SUP	13-215	1C 18	A 5
AP/FD SYS 2 SUP	13-216	2C 20	A17
LAT ACCELMTR 2 26V SUP		2C 42	B16
AP/FD COMP 2 SUP		2C 18	F18

(2) Reset the following circuit breakers:

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-216	X 345	G 4

(3) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(4) At Flight Engineer's station, on EQUIPMENT BAY COOLING panel, make certain that electronics rack ventilation is operating (Ref. 21-21-00).

(5) Pressurize Blue hydraulic system (Ref. 29-12-00, Servicing) and Green hydraulic system (Ref. 29-11-00, Servicing).

(6) Set flight controls and yaw and pitch trim control wheels to neutral position.

(7) On ceiling panel, on flight control unit, place the two BLUE INVERTER and GREEN INVERTER switches in OFF INV position.

(8) On ICOVOL (flight control surface position indicator), check that elevons are in zero degree position.

(9) Open access door 121FB.

(10) Insert rigging pin in pitch synchro chassis lever.

(11) At Flight Engineer's station, remove floor panel 213DF providing access to RJS (C3).

C. Test

(1) On shelf 4-215, at least three minutes after energizing AP/FD computers, remove blanking caps from test connectors ZA on front face of pitch computer 1C12 and of azimuth computer 1C13.

(2) Connect multimeter negative lead to terminal 54 of azimuth computer 1C13 test connector ZA.

(3) Connect multimeter positive lead to terminal 46 of pitch computer 1C12 test connector ZA.

B (4) Measure and read the DC voltage and sign.

(5) Then connect multimeter positive lead to terminal 47 of pitch computer 1C12 test connector ZA.

(6) Measure and read voltage and sign.

(7) Sum algebraic values of voltages measured in (4) and in (6). Sign value shall be taken into account. Sum values as follows :

(a) Voltage measured in (4) x 0.22 + voltage measured in (6) = algebraic sum of voltages.

(b) This algebraic sum must be smaller than 470 mV.

If voltage is greater than 470 mV, adjust as described in paragraph 3 C (2) in order to obtain a voltage lower than 470 mV.

(8) Disconnect multimeter and install blanking caps on computer test connectors ZA.

(9) Remove rigging pin from pitch synchro chassis.

(10) Engage AP1 and check datum adjust unit NOSE UP-NOSE DOWN switch operation (deflection of elevons) (Ref. 22-10-00, Adjustment/Test, Operational Test, paragraph 2 G). Then engage AP2 and repeat check.

(11) On flight control unit, place the two BLUE INVERTER and GREEN INVERTER switches in PWR OFF position.

D. Close-Up

(1) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-216	X 345	G 4

(2) Depressurize Blue hydraulic system (Ref. 29-12-00, Servicing) and Green hydraulic system (Ref. 29-11-00, Servicing).

(3) Install and secure floor panel 213DF.

(4) Close access door 121FB.

(5) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(6) Remove access platform.

3. Check by Means of Test Set

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.440 m (14 ft 8 in)	-
Access Platform 2.960 m (9 ft 8 in)	-
Electrical Ground Power Unit	-
Test Set - Zero Settings - Resolvers	TE3016
RB Rigging Pin-Synchro Pack - Pitch	D925252003
Circuit Breaker Safety Clips	-
Lockwire-Dia. 0.8 mm (0.032 in)	-

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B. Prepare

(1) Trip, safety and tag the following circuit breakers:

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
LAT ACCELMTR 1 26V SUP	2-213	1C 42	A 4
LAT ACCELMTR 2 26V SUP	13-216	2C 42	B16

(2) Connect the electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(3) At Flight Engineer's station, on EQUIPMENT BAY COOLING panel, make certain that electronics rack ventilation is operating.

(4) Pressurize Blue hydraulic system (Ref. 29-11-00, Servicing), and Green hydraulic system (Ref. 29-11-00, Servicing).

(5) Place flight controls in neutral position.

(6) Open access door 121FB.

(7) Insert rigging pin in pitch synchro chassis lever.

(8) At Flight Engineer's station, remove floor panel 213DF providing access to the RJS (C3).

C. Test and Adjust

(1) Check of electrical zero.

(a) On test set panel, make certain that ON-OFF switch is in OFF position.

(b) Check that the three POWER JACKS, FEEL CHASSIS, and AFCS SENSORS switches are in 0 position.

(c) Place SCALE selector switch in 3° position.

(d) Connect 28 VDC supply cable to the aircraft electrical network.

(e) Disconnect the two electrical plug connectors (1) from the two receptacles A and B on relay jack sensor.

(f) By means of cable 3016-205, connect AFCS RELAY JACK connector to the two receptacles A and B.

(g) Place ON-OFF switch in ON position.

(g1) The indicator light must illuminate.

(h) Successively place AFCS SENSORS switch on the four RELAY JACK SENSORS positions 2, 3, 4, and 5.

(i) The maximum output angle value displayed on the test set indicator must be, for each position : ± 0.4 degrees.

NOTE : If this value exceeds 0.4 degrees, carry out RJS adjustment as indicated in paragraph below.

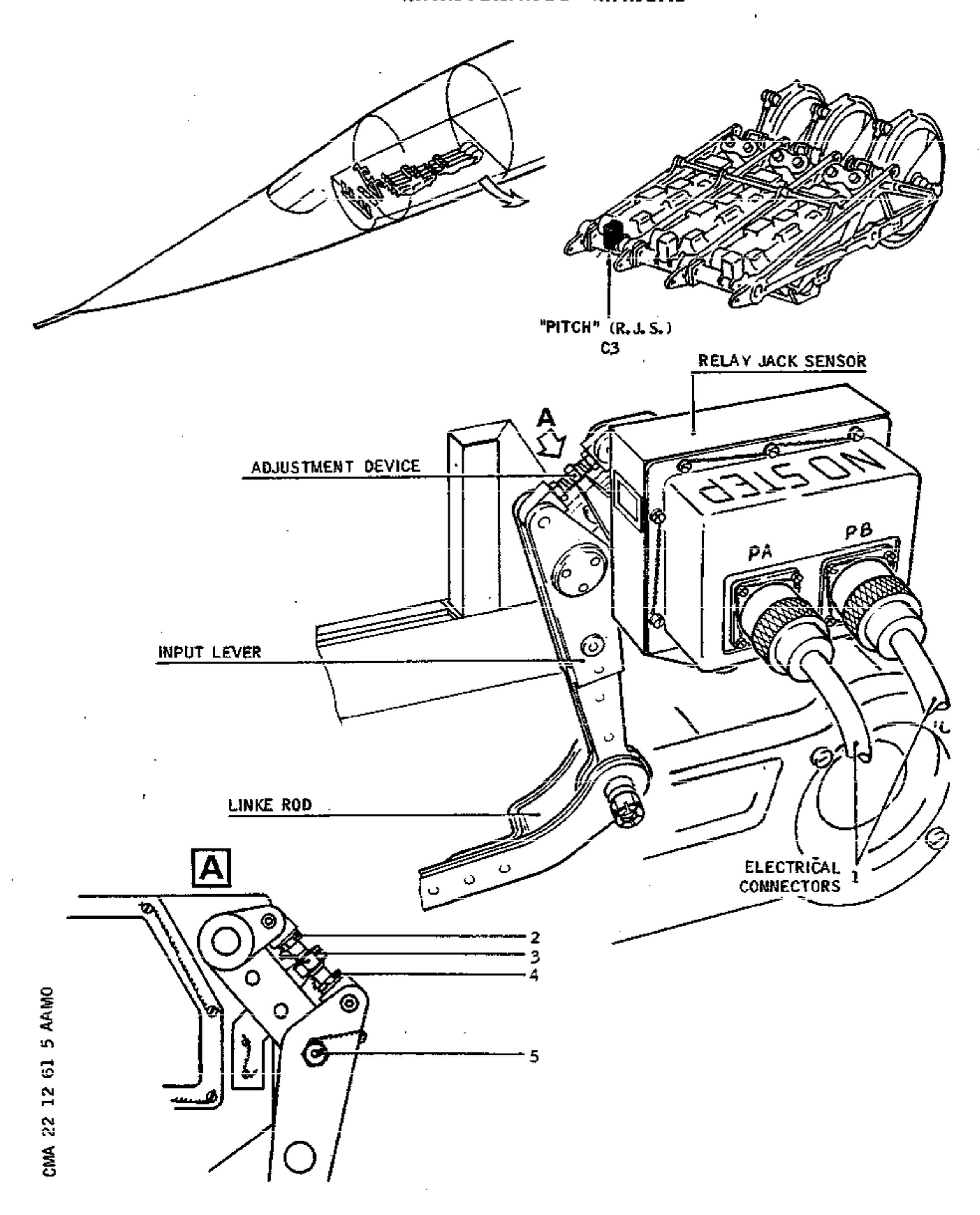
(2) Adjustment of electrical zero

(a) Cut and remove lockwire from nuts (2, 4, and 5)

(b) Loosen relay jack sensor input lever nut (5).

(c) Loosen the two adjustment device nuts (2 and 4).

NOTE : These two nuts have a different type of



Relay Jack Sensor Adjustment Device
Figure 501

thread : nut 2 has a LH threading, nut 4 a RH threading.

(d) By means of the adjusting nut (3), adjust to a maximum output angle value of ± 0.4 degrees for the four above mentioned AFCS SENSORS switch positions.

(e) Fully tighten nut (5) on input lever. Torque to between 30 and 35 lbf.in. (0.33 m.daN and 0.39 m.daN).

(f) Fully tighten the two nuts (2 and 4).

(g) Wirelock nuts (2, 4 and 5).

D. Close-Up

(1) On test set panel

(a) Place ON-OFF switch in OFF position.

(b) Disconnect cable 3016-205.

(c) Disconnect 28 VDC supply cable.

(d) Remove cables.

(e) Place AFCS SENSOR switch in 0 position.

(f) Place SCALE selector switch in 0 position.

(2) Connect the two electrical plug connectors to the associated RJS receptacles, A and B.

(3) Remove safety clips and tags and reset the circuit breakers previously tripped (Ref. paragraph 3B(1)).

(4) Remove rigging pin from pitch synchro chassis.

(5) Engage AP1 and check datum adjust unit NOSE UP-NOSE DOWN switch operation (deflection of elevons (Ref. 22-10-00, Adjustment/Test, Operational Test, paragraph 2 G). Then engage AP2 and repeat check.

(6) Depressurize Blue hydraulic system (Ref. 29-12-00, Servicing), and Green hydraulic system (Ref. 29-11-00, Servicing).

(7) Install and attach floor panel 213DF.

(8) Close access door 121FB.

(9) De-energize the aircraft electrical network and disconnect electrical ground power unit (24-41-00, Servicing).

(10) Remove access platforms.

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END OF THIS SECTION

NEXT

AZIMUTH CHANNEL - DESCRIPTION AND OPERATION

1. General
(Ref. Fig. 001, 002 and 003)

A. The azimuth channel is made up of two separate monitored channels operating on the roll and yaw relay jacks. Operation with only one azimuth channel is possible, but if a fail operative capability is required the engagement of both channels is necessary. With both channels engaged the second channel operates in a synchronizing mode, ready to assume control should the first channel fail. In cruise, only single channel operation is possible.

B. The azimuth channel consists of the following components :

(1) The AFCS control unit (common to the two channels) located on the glareshield midway between the Captain and First Officer, above the centre instrument panel. It contains the common mode selection push-button and
R heading/track (HDG/TRK) and VOR/course set (VOR/LOC) push-pull knobs.

(2) The AFCS datum adjust unit (common to the two azimuth channels), located on the centre console forward of the throttle control levers. It contains a TURN knob which permits turn control.

(3) Two azimuth computers (one for each azimuth channel), located on the shelves in the electronics racks ; computer No.1 on shelf 4-215, computer No.2 on shelf 4-216.

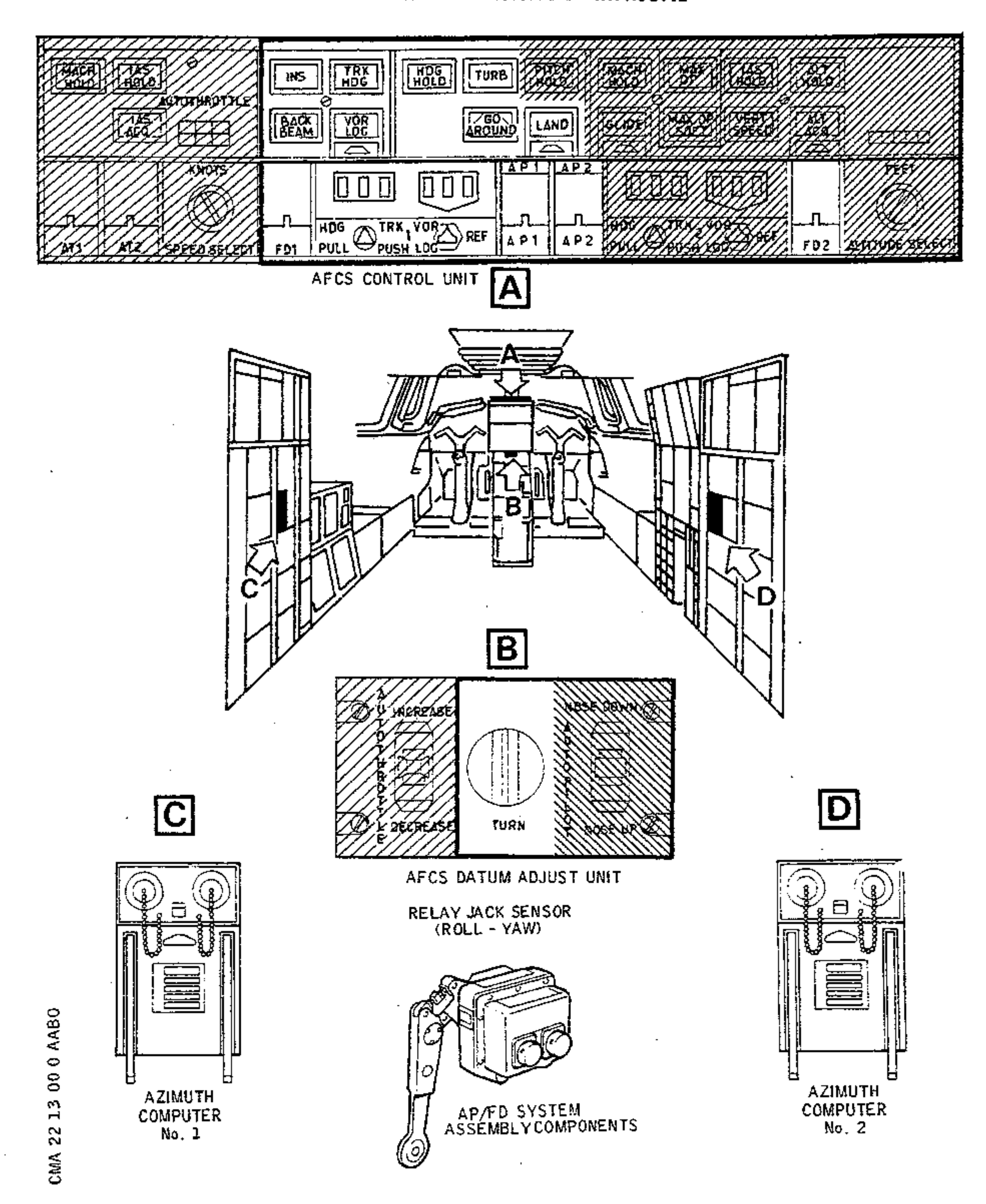
(4) Two relay jack sensors

These are mounted on the relay jack chassis.
The input lever of one is actuated by the roll relay jack.
The input lever of the other is actuated by the yaw relay jack.

C. Various data sources provide the azimuth channel with essential information used as reference data for accurate aircraft piloting along the roll and yaw axes.
The following data sources are used.

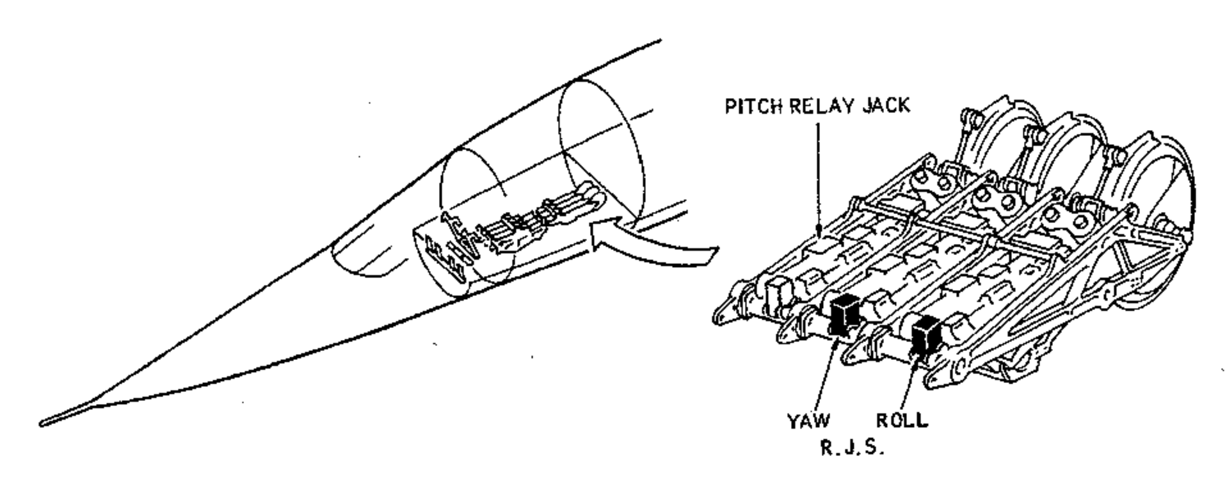
(1) Inertial navigation system (INS).

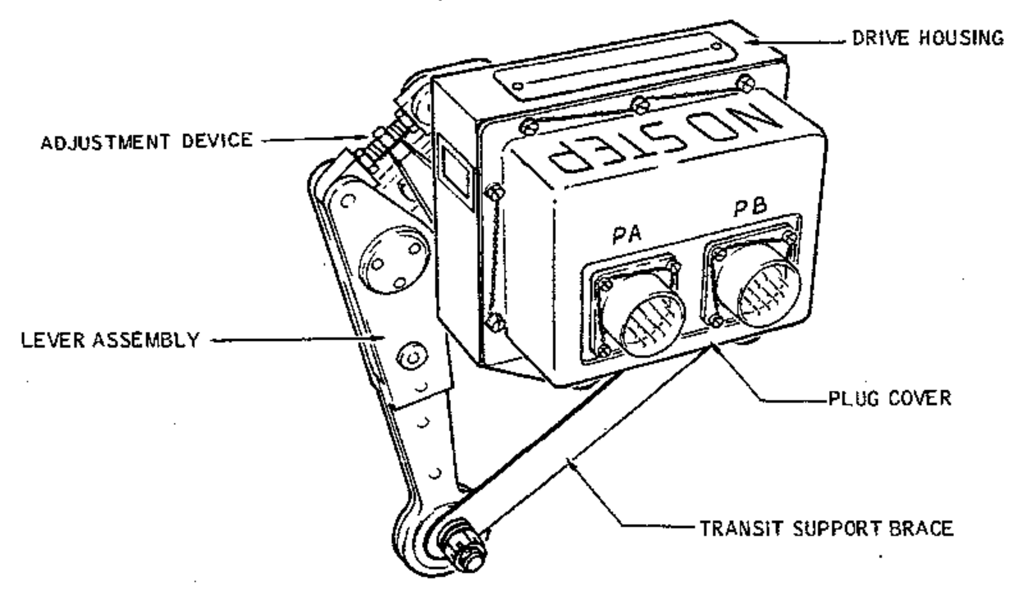
Each INS sends the following signals to the corresponding azimuth computer :



Azimuth Channel Components
Figure 001

R

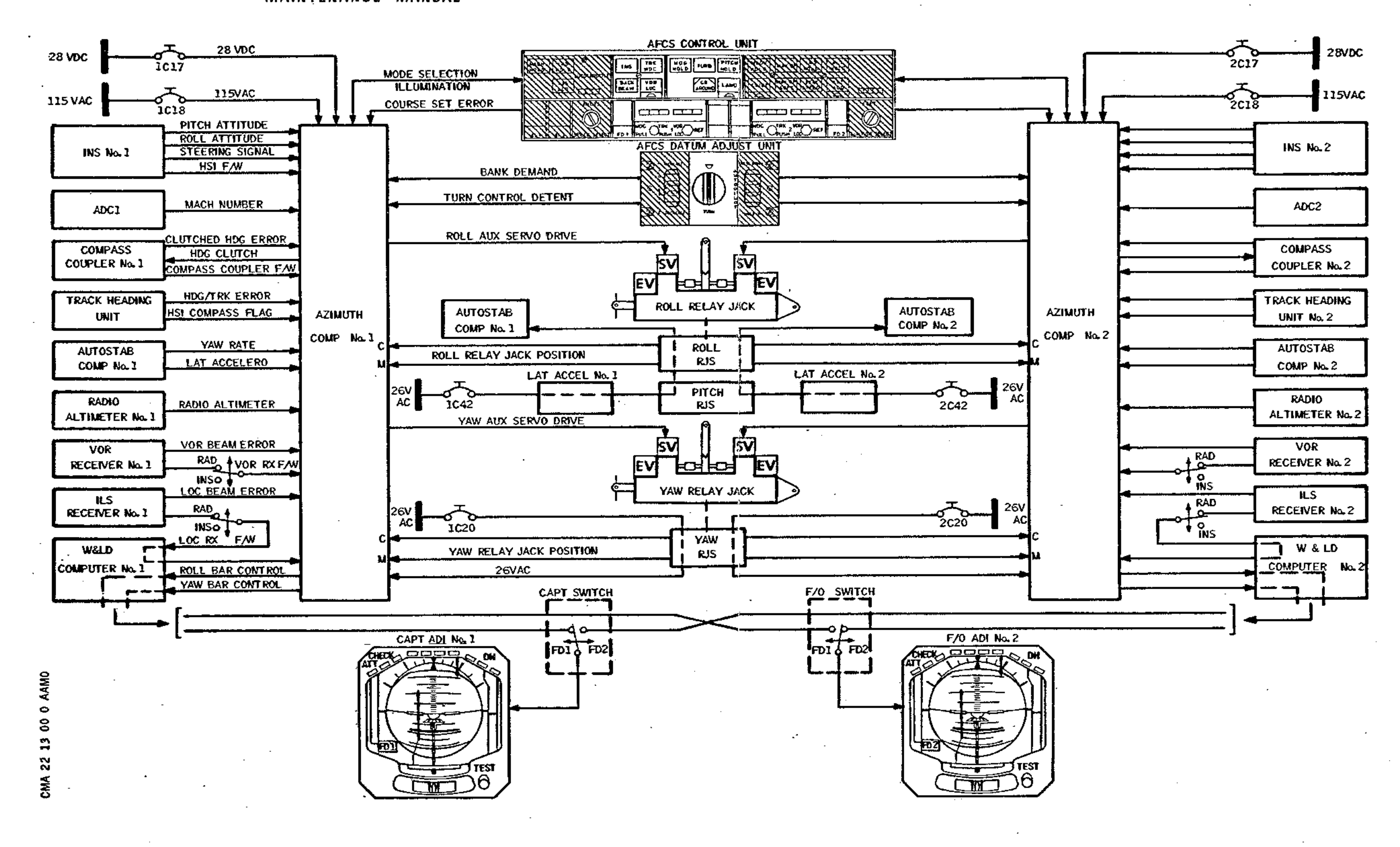




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R Roll and Yaw Relay Jack Sensor Location
Figure 002

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R

Azimuth Channel - Block Diagram
Figure 003

(a) A PITCH ATTITUDE signal

(b) A ROLL ATTITUDE signal

(c) A STEERING signal

(d) A validity signal (HSI F/W).

(2) Air data computer (ADC)

Each ADC sends a MACH NUMBER output to the corresponding azimuth computer.

(3) Compass coupler

Each compass coupler sends the following signals to the corresponding azimuth computer :

(a) A clutched magnetic heading (CLUTCHED HDG ERROR) signal generated by a clutchable synchro-transmitter.

(b) Its validity signal (COMPASS COUPLER F/W).

Each azimuth computer sends a synchro-transmitter clutching signal (HDG CLUTCH) to the corresponding compass coupler.

(4) Track heading unit

Each track heading unit sends the following signals to the corresponding azimuth computer :

(a) A heading or course error signal (HDG/TRK ERROR)

(b) A track heading unit monitoring signal (HSI COMPASS FLAG).

(5) Autostabilization computer.

Each autostabilization computer sends the following signals to the corresponding azimuth computer :

(a) A YAW RATE signal

(b) A lateral acceleration signal (LAT ACCELERO)

(6) Radio altimeter

Each radio altimeter sends a RADIO ALTITUDE signal to the corresponding azimuth computer.

(7) VOR receiver

Each VOR receiver sends the following signals to the corresponding azimuth computer :

(a) A VOR BEAM ERROR signal.

(b) A VOR receiver validity signal (VOR RX F/W). This validity signal passes through the RAD/INS switch.

(8) ILS receiver

Each ILS receiver sends the following signals to the corresponding azimuth computer.

(a) A LOC BEAM ERROR signal.

(b) An LOC receiver validity signal (LOC RX F/W). This validity signal passes through the warning and landing display (W & LD) computer and the RAD/INS switch.

D. These signals are treated by the azimuth computers, which generate the following control output signals :

(1) When one AP is engaged the corresponding azimuth computer sends out two control signals.

(a) One is sent to the roll relay jack servovalve (ROLL AUX SERVO DRIVE signal).

(b) The other is sent to the yaw relay jack servovalve (YAW AUX SERVO DRIVE signal).

NOTE : During dual channel operation, in approach and automatic landing configurations, azimuth channel 1 is in control via the Blue servovalves of the roll and yaw relay jacks, with azimuth channel 2 in a synchronizing condition.
In the event of an autochangeover due to an azimuth channel 1 disconnect, azimuth channel 2 assumes control via the Green servovalves.

(2) When one FD is engaged the corresponding azimuth computer sends out two control signals ; one is sent to the roll bar (ROLL BAR CONTROL signal) and the other is sent to the yaw bar (YAW BAR CONTROL signal) of the
R associated attitude director indicator (ADI). These
R two signals can be cancelled at the output amplifier
R level by the ROLL BAR REMOVAL and YAW BAR REMOVAL logic
R signals, which are dealt with in paragraph 3. F.

NOTE : Both FDs can be engaged in all flight phases. In normal operation ADI 1 receives commands from azimuth computer No.1 and ADI 2 receives commands from azimuth computer No.2. However, both ADIs can be linked to a single azimuth computer by means of the FD1/FD2 switches located on the Captain's and First Officer's instrument panels. The ROLL BAR CONTROL and YAW BAR CONTROL signals pass through the W & LD computers (Ref. 22-41-00, Description and Operation, paragraph 5. C. (9)).

(3) The two relay jack sensors each send a double signal (control and monitoring) to the two azimuth computers, proportional to the displacement of the roll and yaw relay jacks.

E. Power Supply

(1) The azimuth computers are supplied with 28VDC, 115VAC and 26VAC through circuit breakers 1C17, 1C18 and 1C20 (computer No.1) and 2C17, 2C18 and 2C20 (computer No.2) respectively.

NOTE : The 26VAC supply passes through the yaw relay jack sensor, and thus monitors supply to this component.

(2) The roll relay jack sensor is supplied with 26VAC through circuit breakers 1C42 (for channel 1) and 2C42 (for channel 2). These circuit breakers are part of the autostabilization system. The power supply to this component is monitored as follows: The lateral accelerometer of the autostabilization system, the pitch and roll relay jack sensors and the autostabilization computer are supplied in series. A faulty connection to one of these components inhibits autostabilization engagement, and thus AP engagement.

2. Description of Common and Azimuth Modes

A. Mode Selection and Engagement

The mode selection push-buttons are located on the AFCS control unit. A mode is selected by pressing the corresponding push-button. This operation causes a selection demand, and disengagement of the mode previously selected, after the new mode has been accepted by the engage logic of the computers.
The push-button then illuminates (2 lamps).

NOTE : The logic circuits of the azimuth modes are located in the azimuth computers, as are the logic circuits of the LAND and TURB common modes and the circuits associated with GO AROUND operation.
These are studied in paragraph 5, for each mode individually.

B. HDG HOLD Mode

This mode does not exist in the FD system.
It is automatically selected on AP engagement. Its engagement logic is therefore identical to the AP engagement logic (Ref. 22-11-00, Description and Operation, paragraph 4).

In this mode the AP holds the aircraft magnetic heading existing at the moment of engagement.
The heading can be changed using the TURN knob on the AFCS datum adjust unit. This knob can be used to bank the aircraft up to a maximum of 35 degrees bank angle.
When the TURN knob is moved from the neutral position the HDG HOLD mode is disengaged. When the TURN knob returns to the neutral position the HDG HOLD mode is re-engaged, and the AP holds the heading existing at that moment.

R NOTE : When the AP/FD is in another azimuth mode, operation
R of the TURN knob causes on automatic return to the
R HDG HOLD basic mode.
In approach, rotation of the TURN knob has no effect.

C. TURB Mode

This mode, which exists only in the AP system, is engaged when the TURB push-button is pressed.
The AP azimuth channel returns to the basic HDG HOLD mode with reduced gains (This action also affects the AP pitch channel which returns to its basic PITCH HOLD mode). The TURB push-button only illuminates on the AFCS control unit.
The FDs disengage, if they were previously engaged.

In the azimuth plane the AP holds the magnetic heading existing at the moment of engagement of the TURB mode.

This mode disengages on selection and engagement of any other pitch or azimuth mode. In this case the AP returns automatically to the basic mode of the channel for which no mode is selected.

D. TRK/HDG Mode

This mode exists in both the AP and FD systems.
As soon as this mode is selected the HSI COMPASS FLAG logic signal is added to the AP engage logic conditions. If the signal is healthy (+28VDC) the TRK/HDG push-button illuminates and the AP/FD remains engaged in this mode.

NOTE : The HSI COMPASS FLAG signal, generated in the track heading unit, covers both HSI faults and faults in the track heading unit (Ref. 22-10-00, Description and Operation, paragraph 3. G.).

This mode is used to hold a heading or a course selected on the AFCS control unit. The choice between a heading (HDG) and a course (TRK) is carried out by pulling or pushing the HDG/TRK push-pull knob on the AFCS control unit.

(1) Heading selection (Ref. Fig. 004)

When the HDG/TRK push-pull knob is pulled the HDG marker appears in display window (1) on the HSI.

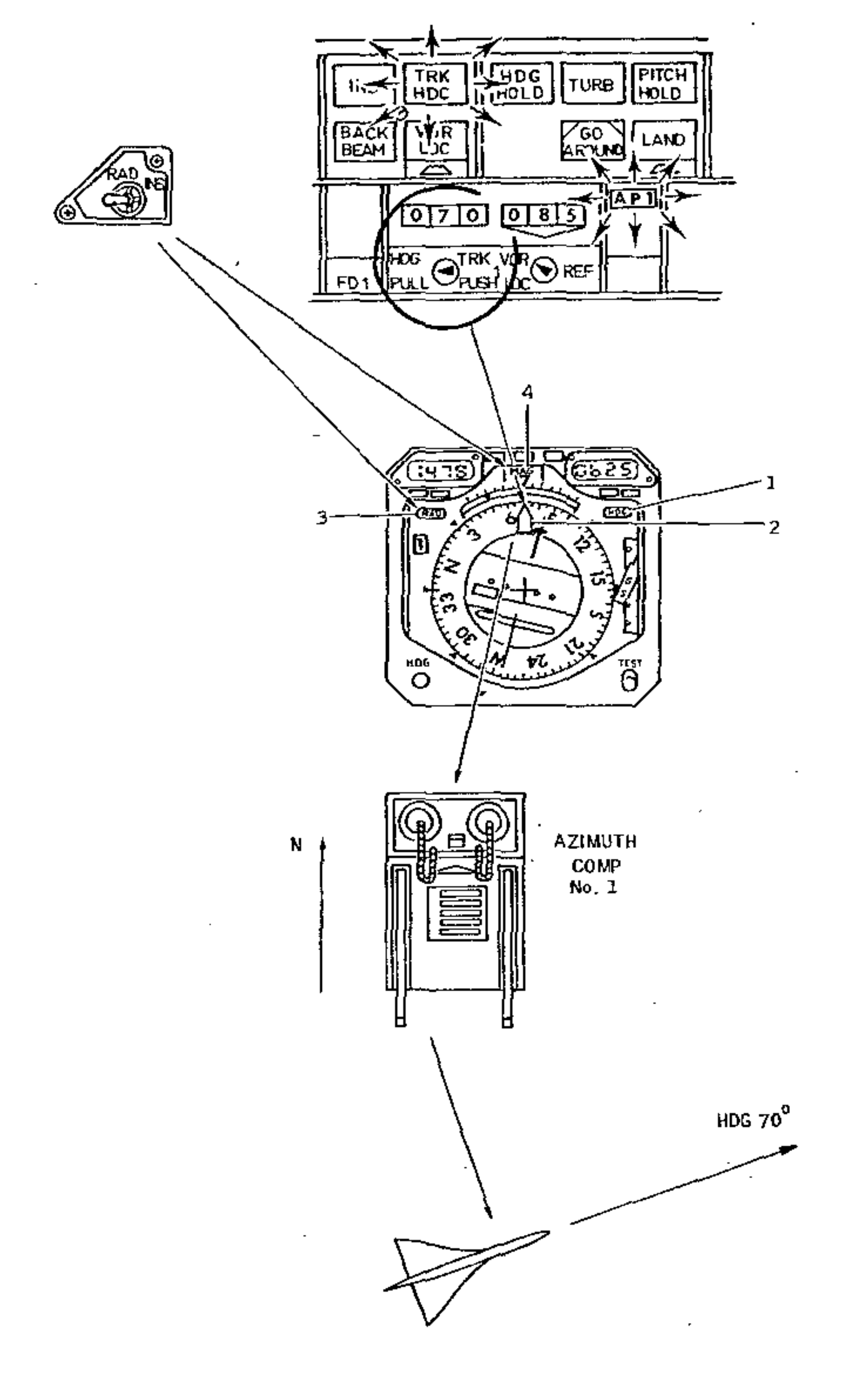
The pilot can choose a new heading by turning the HDG/TRK push-pull knob (for example heading = 100 degrees) This push-pull knob controls the movement of a pointer (2) on the HSI.
The AP azimuth channel makes use of the difference between the aircraft heading and the selected heading to command a change of heading. When the aircraft has reached the new heading the pointer (2) points to the aircraft heading.

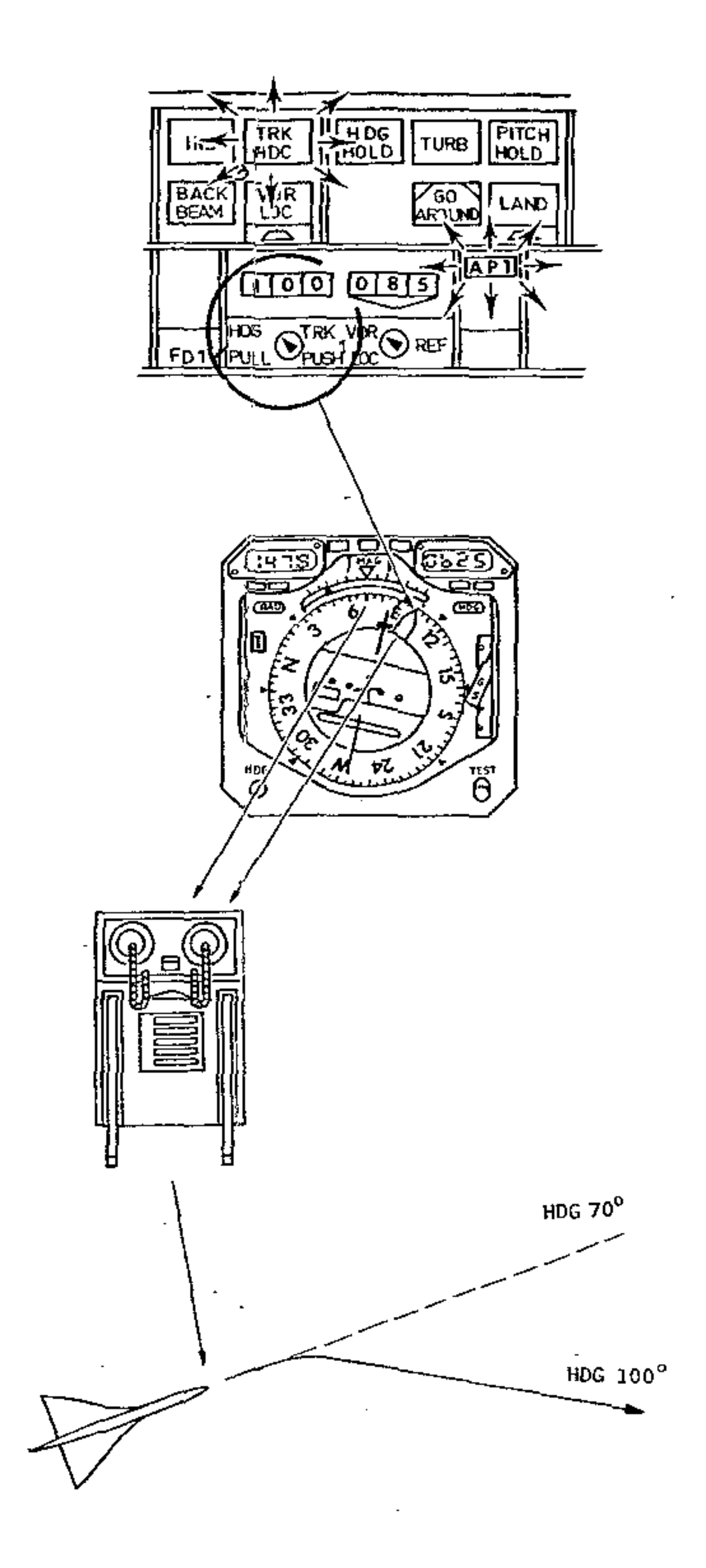
The aircraft can be flying on either a magnetic or a true heading. The choice between magnetic and true heading is made using the RAD/INS switch located on either side of the AFCS control unit. With the switch in RAD position (magnetic heading) the RAD and MAG markers appear in display windows (3) and (4). These markers are replaced by the INS and TRUE markers when the switch is in the INS position (true heading).

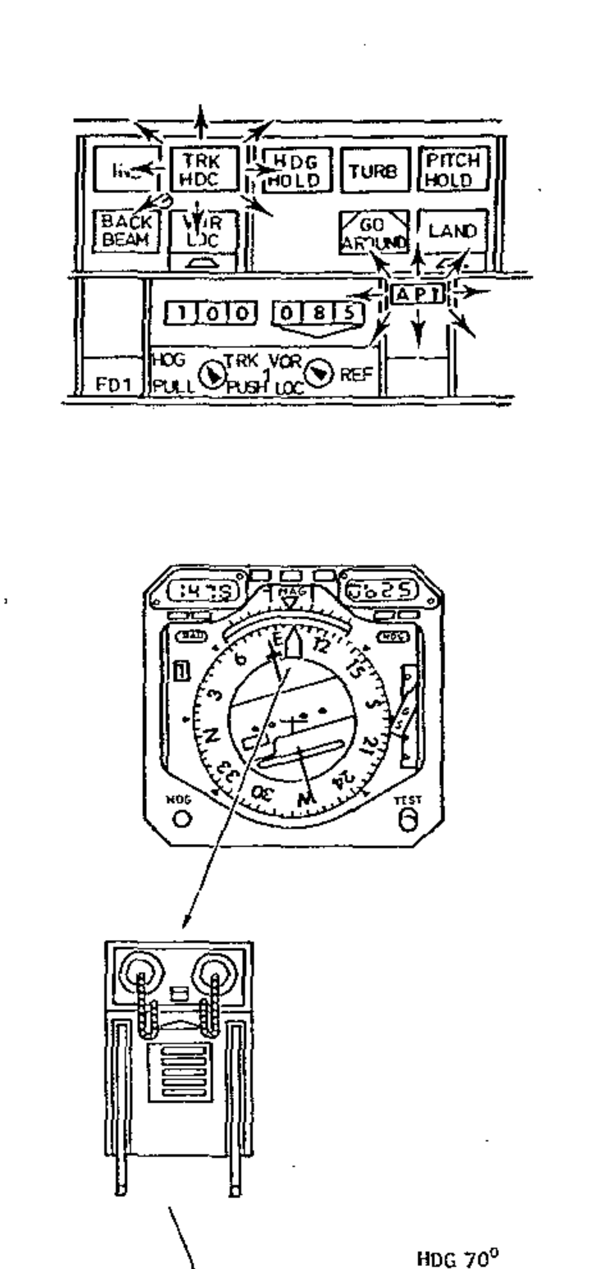
NOTE : The magnetic heading is given by compass coupler

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R

HDG Mode
Figure 004

No.1 or No.2, depending on the position of the COMP 1/COMP 2 switch.
The true heading is given by INS No.1 or INS No.2, depending on the position of the NAV INS 1/NAV INS 2 switch (Ref. 22-10-00, Description and Operation, paragraph 3. G.).

(2) Course selection (Ref. Fig. 005)

When the HDG/TRK push-pull knob is pushed the TRK marker appear in display window (1) on the HSI.

The pilot can choose a new course by turning the HDG/TRK push-pull knob. The pointer (2) moves when the push-pull knob is turned, so the new course selected (20 degrees, for example) is displayed on the HSI. The previous course (45° in this example) is given by the drift pointer (3).
The AP azimuth channel makes use of the difference between the initial course and the course selected to control the change of course. When the aircraft is on the new course the pointer (2) and the drift pointer point in the same direction.

The aircraft can be flying on either a magnetic or a true heading (true heading in the example given).

E. INS Mode (Ref. Fig. 005)

This mode exists in both the AP and FD systems.
As soon as this mode is selected the HSI F/W signal is added to the AP/FD engage logic conditions. This signal is generated in the INS.

In this mode the AP/FD captures and holds an INS course between two different way points selected on the INS control and display unit (CDU).

On the HSI the INS course is displayed by pointer (4).

F. VOR Mode (Ref. Fig. 006)

The VOR mode is used to capture and hold a VOR radial selected on the AFCS control unit.
It exists in both the AP and FD systems.
The mode selection push-button is common to both the VOR and LOC modes. The two modes are differentiated in the mode logic by presence or absence of a LOC frequency set on the VOR/ILS/DME control unit.
The VOR mode comprises five phases :

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INS TRK HDG HDG HOLD TURB PITCH HOLD BACK BEAM VOR LOC GO AROUND LAND

0 4 5 0 8 5 AP 1

FD 1 HDG PULL TRK PUSH VOR LOC REF

RAD INS

3 4 1 2

AZIMUTH

COMP No. 1

TRK 45°

DRIFT

HDG 70°

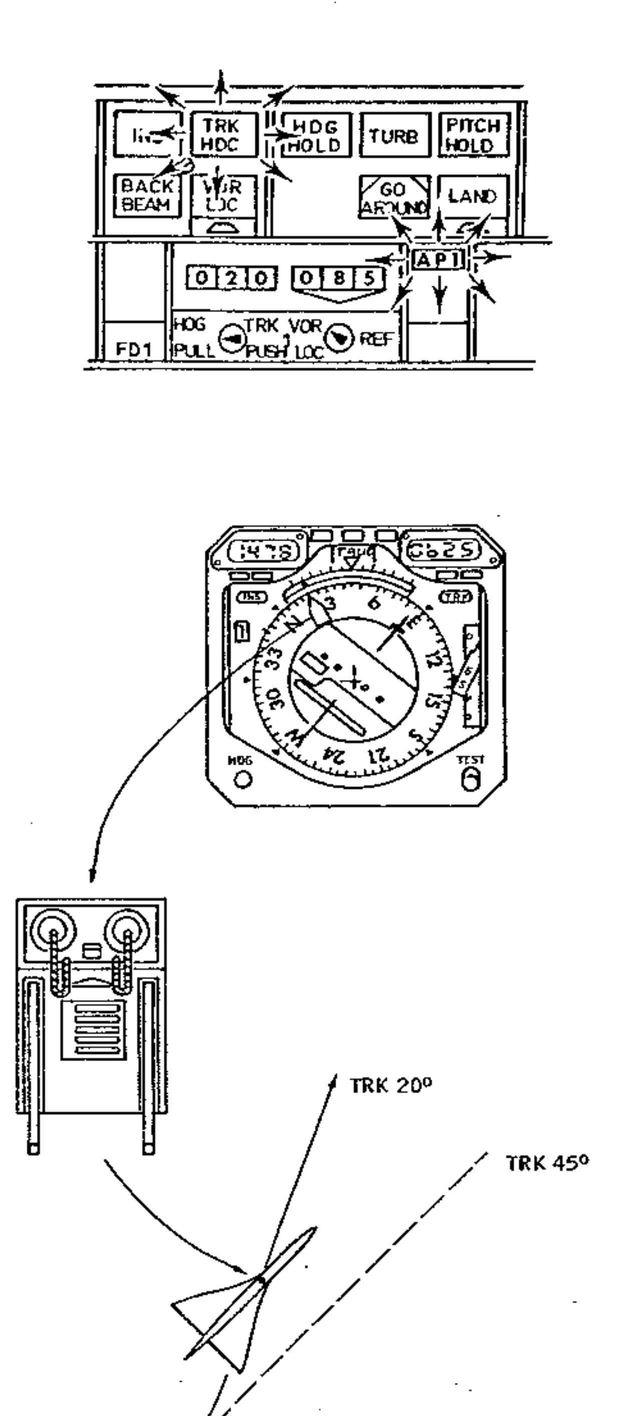
INS TRK HDG HDG HOLD TURB PITCH HOLD BACK BEAM VOR LOC GO AROUND LAND

0 2 0 0 8 5 AP 1

FD 1 HDG PULL TRK PUSH VOR LOC REF

TRK 20°

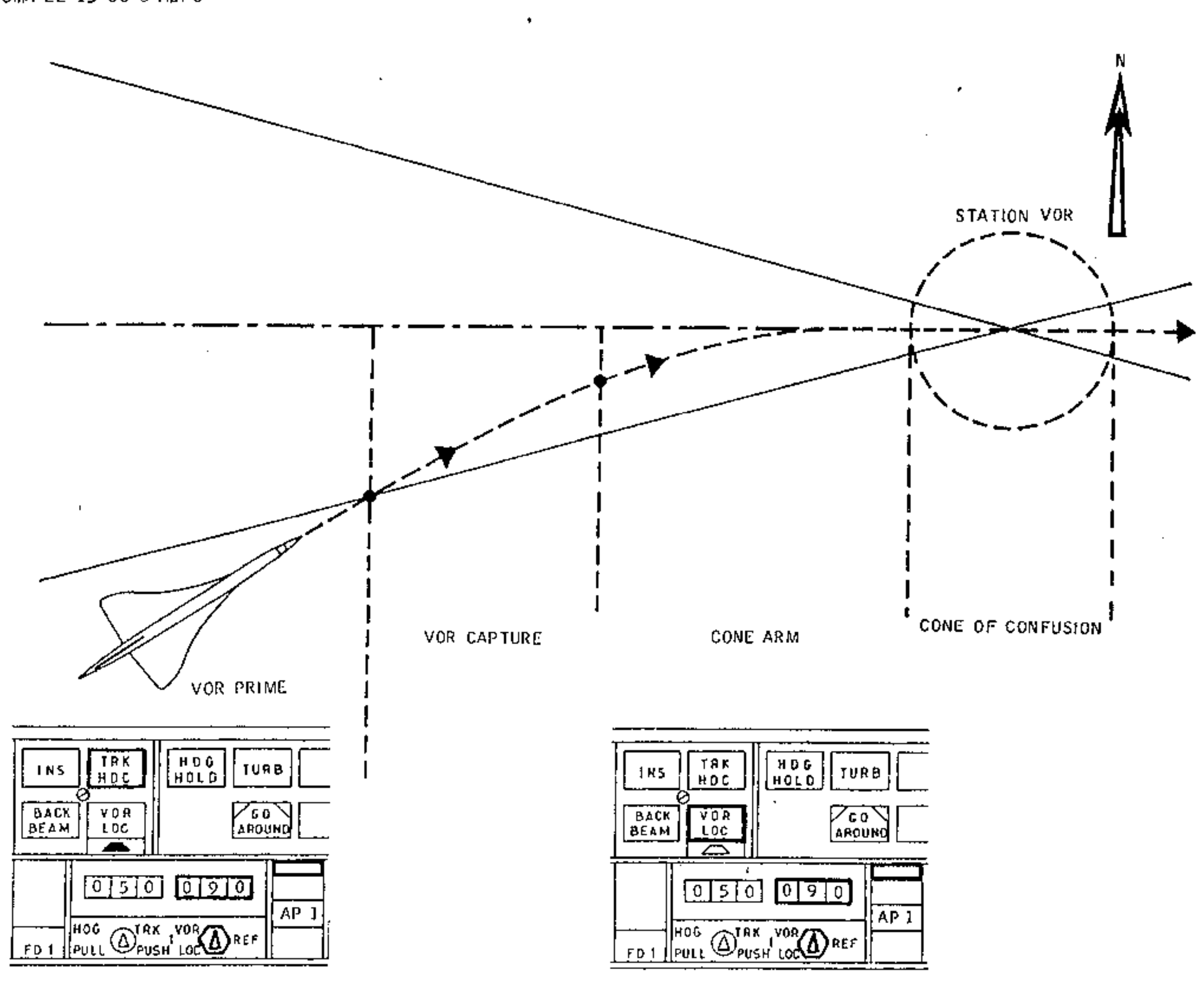
TRK 45°



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R

TRK Mode
Figure 005



R

VOR Mode
Figure 006

(1) On selection of the VOR mode the prime indicator light located below the VOR/LOC push-button illuminates, indicating that this mode has been selected, but is not yet engaged. The azimuth computer maintains the mode previously engaged (TRK/HDG mode in example).

The pilot sets the VOR frequency and the radial of the VOR station towards which he wants to go.

VOR beam capture must occur at the correct angle (between 20 and 60 degrees). The pilot therefore modifies the aircraft heading to bring it within these limits. (In the example the aircraft heading is 50 degrees and the VOR radial is 90 degrees).

(2) At the moment of capture, as determined by the analog channel level switches, the TRK/HDG push-button and the prime indicator light extinguish and the VOR/LOC push-button illuminates. The VOR mode is then active and the aircraft, guided by the VOR station, aligns itself with the radial selected.
The VOR receiver validity signal (VOR RX F/W) is added to the AP/FD engage logic conditions.

(3) The hold phase of the radial selected (CONE ARM phase) is initiated and then maintained when the error signal is less than a given value.

(4) Once the aircraft is close to the VOR transmitter the VOR signal is confused (CONFUSION CONE phase) and is no longer used as a guiding signal. It is replaced by the COURSE SET ERROR signal (aircraft heading minus radial selected). The AP/FD then holds the radial selected.

NOTE : When the aircraft is in the confusion cone the VOR radial can be changed. In this case the aircraft captures the new radial on leaving the confusion cone.

(5) On leaving the confusion cone, the AP/FD once again holds the radial selected.

G. LOC Mode

The LOC mode is used to capture and hold a Loc beam. It is used on landing, in either the AP or FD.

This mode is selected in the same way as the VOR mode. It can be differentiated from the VOR mode by the presence of the LOC FREQUENCY SELECT signal coming from the VOR/ILS/DME

control unit.

The LOC mode comprises three phases :

(1) During preparation for approach the pilot sets the ILS frequency, and uses the VOR/LOC push-pull knob to set the runway heading. On LOC mode selection the corresponding prime indicator light illuminates (As a rule, the AP/FD is in TRK/HDG mode).

(2) As in the VOR mode, capture is determined by the analog channel level switches. The TRK/HDG push-button and the prime indicator light then extinguish and the VOR/LOC push-button illuminates. When the LOC mode is engaged, the LOC receiver validity signal (LOC RX F/W) is added to the AP/FD engage logic conditions. The aircraft, guided by the LOC beam, goes to the runway bearing.

(3) The LOC TRK phase is initiated when the aircraft is aligned with the LOC beam and the LOC BEAM ERROR signal is less than 15 microamps for more than 18 seconds. This phase is monitored by the comparators on the analog channels.

H. LAND Mode
(Ref. Fig. 007)

This mode allows capability II or capability III automatic approach and landing.

The various phases of automatic approach and landing are as follows :

(1) Interception phase (Point A)

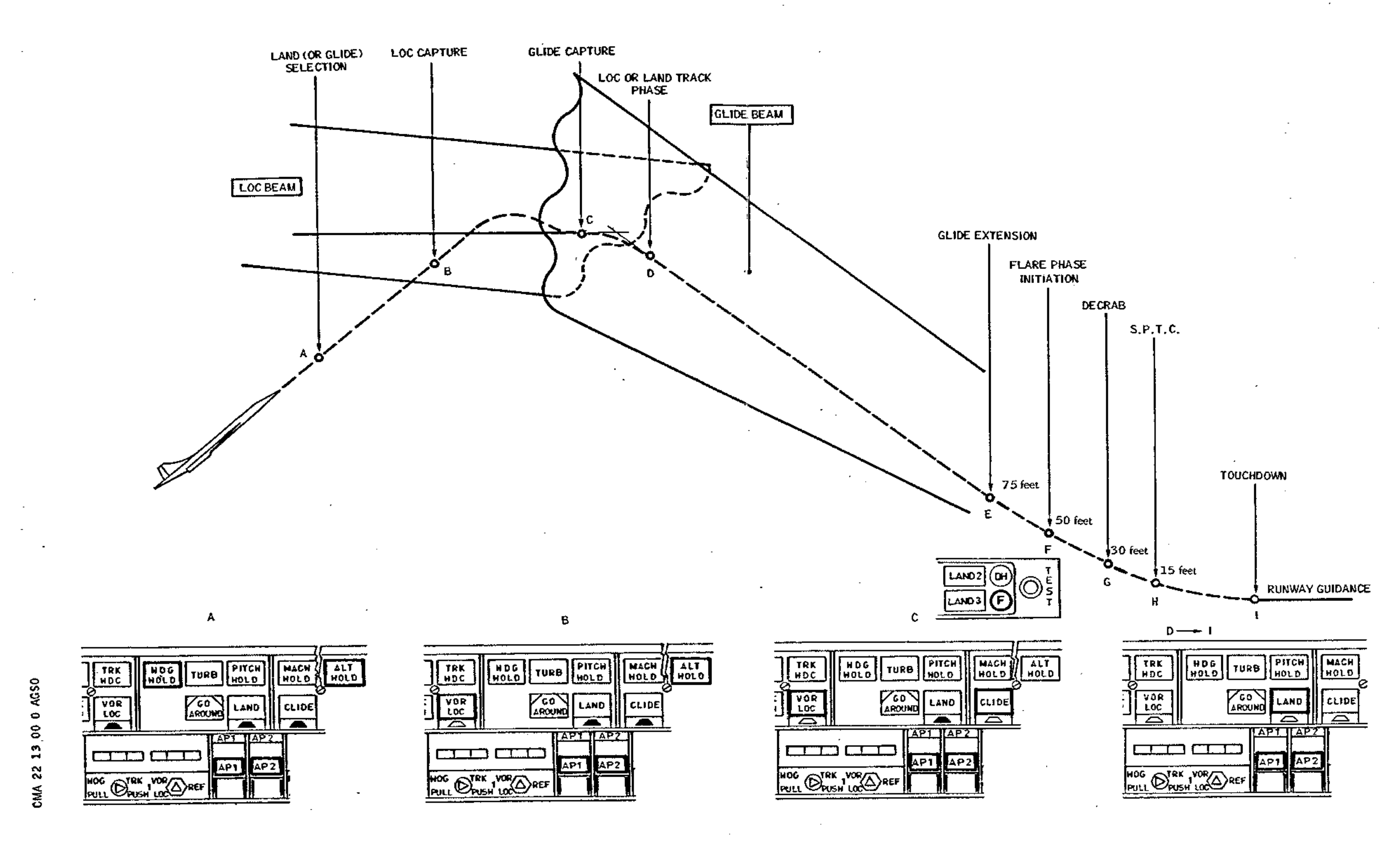
The pilot selects the LAND mode on the AFCS control unit. The prime indicator lights under the GLIDE, VOR/LOC and LAND push-buttons illuminate.
The AP/FD system is at this moment in any azimuth mode and any pitch mode, HDG HOLD and ALT HOLD (2000 ft.) for example. The autothrottle is in the IAS ACQ mode, with an approach speed selected.

As soon as LAND mode is selected the second AP can be engaged.

(2) LOC capture (Point B)

This is indicated by illumination of the VOR/LOC push-button and extinction of the corresponding prime indi-

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Different Phases of on Automatic Landing
Figure 007

cator light and the HDG HOLD push-button.
The VOR/LOC mode engage logic is as follows :
- LOC frequency selected
- No LOC receiver failure
- Capture detected by the analog channel level switches.

(3) GLIDE capture (Point C)

This is indicated by illumination of the GLIDE push-button and extinction of the corresponding prime indicator light and the ALT HOLD push-button.
The GLIDE mode engage logic is as follows :
- No GLIDE receiver failure.
- Capture detected by the analog channel level switches.

After GLIDE capture in LAND mode, the radio altimeter validity signal is monitored by the W & LD computer (Ref. 22-41-00, Description and Operation).

(4) LOC TRACK (Point D)

The logic switches to LOC beam holding phase when the TRACK condition is obtained (determined by a detector).

This switching is indicated by a change in push-button illumination (illumination of LAND push-button and extinction of VOR/LOC and GLIDE push-buttons) only if it occurs after GLIDE capture.

(5) GLIDE EXTENSION (Point E)

The GLIDE EXTENSION phase is initiated at an altitude of 75 ft. by a radio altimeter contact.

At this moment the GLIDE signal is cancelled and the AP/FD ensures vertical speed holding.

The calculation channels no longer use the GLIDE signal, so GLIDE transmitter and receiver failures have no effect on the AP/FD logic.

(6) FLARE (Point F)

The flare phase is initiated at a radio altimeter altitude of less than 50 ft when the vertical speed determined by the flare function is greater than or equal to the aircraft vertical speed.

(7) DECRAB (Point G)

This phase is initiated at an altitude of 30 ft. and aligns the aircraft with the runway axis so as to reduce the lateral force on the landing gear at touch-down.

(8) START PROGRAMMED THROTTLE CLOSURE (Point H)

At an altitude of 15 ft. the AP/FD initiates an automatic throttling down. The throttle control levers move towards the idle position at a rate of 4 degrees per second.

(9) RUNWAY GUIDANCE

After disengaging both APs (only the two FDs engaged) the yaw pointers on both ADIs allow the aircraft to be guided along the runway with reference to the LOC beam.

I. GO AROUND Mode

The GO AROUND function is initiated after LOC and GLIDE capture by disconnecting the autothrottle and pushing at least two throttle control levers to the maximum thrust position.

If the approach was performed in GLIDE mode, the GLIDE and VOR/LOC push-buttons extinguish and the GO AROUND caption light illuminates on the AFCS control unit.
If the approach was performed in LAND mode the LAND push-button extinguishes and the GO AROUND caption light illuminates.

The GO AROUND function ensures aircraft rotation until a preset pitch altitude of 15 degrees is obtained (pitch channel) and holds the aircraft on the runway axis (azimuth channel).

This mode remains engaged until the AP is disconnected by the pilot or until HDG HOLD basic mode is selected. In this mode the aircraft is controlled in heading hold and in 15 degrees altitude hold.
Both A/P's may be engaged in the GO-AROUND mode until a basic mode is re-selected and A/P2 will automatically disengage.

J. BACK BEAM Mode

This mode exists only in the FD and allows the LOC beam to be captured and held from the rear up to a height of approximately 1000 ft. It has no automatic capture. Capture is therefore manual and is initiated on selection of the mode.

It can be used at an angle of interception of up to 45 degrees and at an airspeed of 210 knots when the FD bars are not against their stops.

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3. Computer - Azimuth AP/FD

A. Description

Each azimuth computer is contained in a half ATR short case and weighs 13 kg.
Computer No.1 is installed on shelf 4-215 and computer No.2 is installed on shelf 4-216.

Two grip handles are attached to the front panel and are used to remove the computer and to secure it on its rack.

Between the handles there are two connectors, ZA and ZB, fitted with protective caps, which are used to test the computer.

When the computer is supplied with power the elapsed time counter starts operating and the pointer starts vibrating.

Two double connectors are located on the rear panel ; these are used for connections between the computer and the aircraft wiring.

B. Composition

Each computer comprises :

(1) One power supply unit.

(2) Logic circuit boards.

On these circuit boards are located the FD engage logic circuits and the azimuth and common mode engage logic circuits.

(3) Control and monitoring analog circuit boards.

On these circuit boards are located the analog circuits of the azimuth and common modes (for common modes, the azimuth function only).

C. Power Supply Unit

The power supply unit generates +12V, -12V, +15V, -15V and +7V supplies using the 115VAC 400Hz supply.

These voltages are generated in series ; faults are detected by an output comparator.
This comparator compares the -15V from the azimuth computer and the -15V from the pitch computer.
If a fault is detected the comparator causes the -15V to be

cut in the azimuth computer and the 115VAC 400Hz supply to be cut in the pitch computer.

NOTE : This cut can be seen on the pitch computer elapsed time counter (the pointer is immobilized).

The interconnections between the pitch and azimuth computer power supply units and the interconnections between the power supply units and the systems which make use of the +15V and -15V voltages are described in 22-11-00, Description and Operation, paragraph 8.

D. FD Engage Logic

The FD engage logic is described in 22-11-00, Description and Operation, paragraph 5.

E. Mode Logic

Basically, the signal from the mode selection push-button is converted into a binary code (distinct code for each mode) then stored in registers.

This binary signal is then decoded to obtain the mode selection signal. (This signal is sent to the registers to cancel the mode previously engaged). Each output from the decoder corresponds to one particular mode.

The mode selection signal is sent to the register and the decoder through a mode selection push-button anti jam circuit.

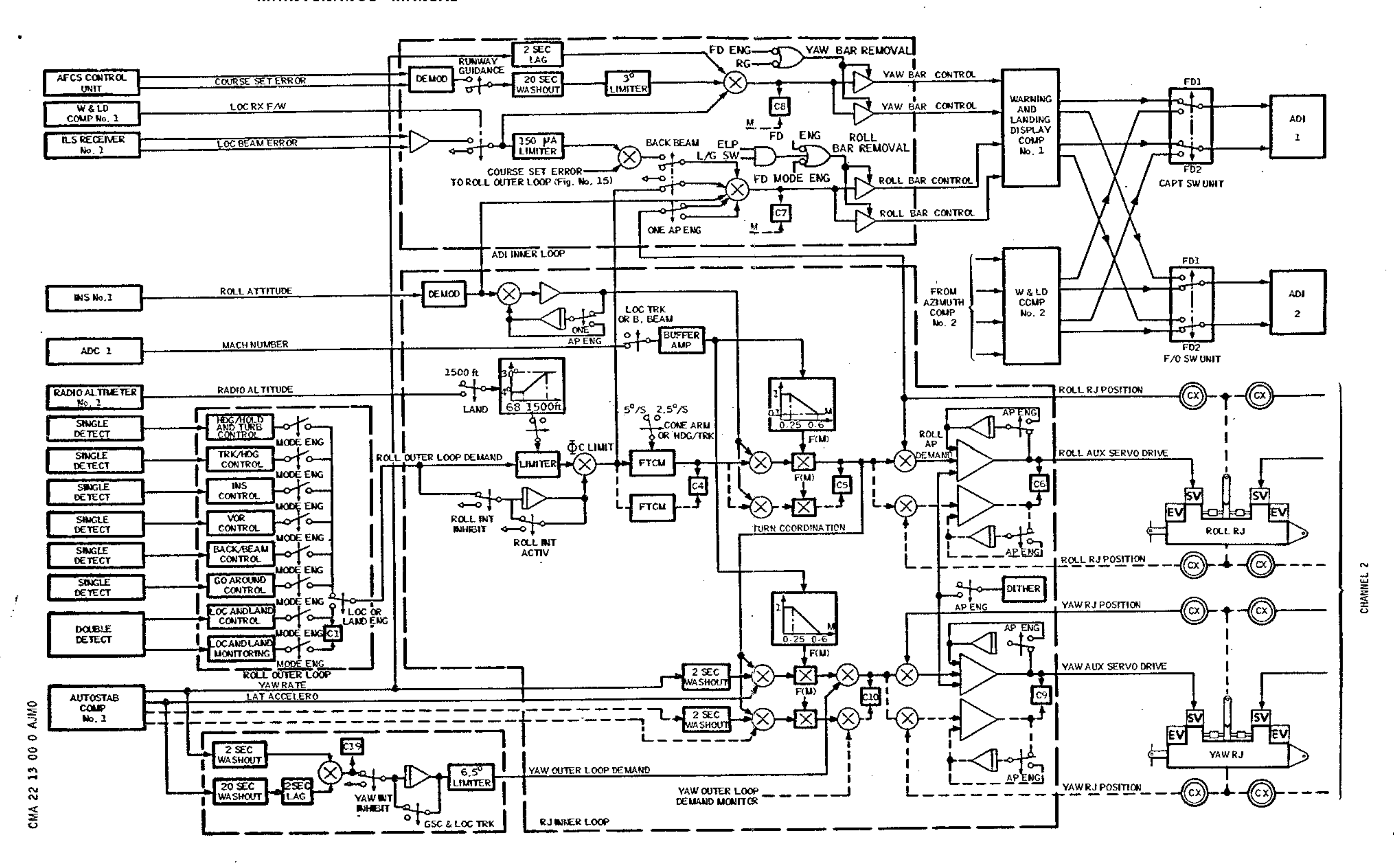
NOTE : There is no limitation in mode selection. The mode engages if its logic is healthy.
Mode logic is described when dealing with mode operation. For certain modes a validity signal for the peripheral equipment associated with the active mode is added to the AP/FD engage logic conditions. If there is a fault in the mode, the AP/FD disengages and the associated warnings are activated.

F. Analog Channels (Ref. Fig. 008)

(1) Description

The main part of the analog channels are common to the AP and the FD, as far as the inner loop level, where the two channels are separated and their signals are sent to the relay jacks (AP system) or to the ADIs (FD system).
These computation channels can be divided into two

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Breakdown of Analog Channels
Figure 008

EFFECTIVITY: ALL

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parts :

(a) The circuits specific to each mode which generate the Φc control signals and which make up the outer loop.
It can be seen that these circuits are not duplicated for the cruise modes, and the control signals are issued by single detectors. For the approach modes the circuits are duplicated and the signals are issued by dual detectors.

(b) The circuits making up the inner or basic loop are common to all the modes and process the following control signals :

- Φc : generated by the channels specific to each mode.

- ay : lateral acceleration, provided by the autostabilization system lateral accelerometer.

- r : yaw rate, provided by the autostabilization yaw gyro.

- Φ : inner loop servo-signal, provided by the INS.

- x : roll position return, provided by the roll relay jack sensor.

- y : yaw position return, provided by the yaw relay jack sensor.

The roll-rudder connection is carried out by a co-ordination signal.

(2) Operation

(a) Outer loop

All the circuits making up the outer loop are studied in paragraph 5, Operation.

(b) ADI inner loop

(b1) The FD roll bar receives, through a summing circuit, a signal whose amplitude is a function of the Φ - Φc difference, up to a certain limit. The effective aircraft position, Φ, is compared with the roll control signal

Φc.
This signal is compared with the roll position return signal, x.

In the BACK BEAM mode only, the roll control signal (Φc) is replaced by the LOC BEAM ERROR signal (from the ILS receiver) and the COURSE SET ERROR signal from the AFCS control unit.

A ROLL BAR REMOVAL logic signal cancels the FD roll bar command signal when the FD is not engaged in an FD mode or on landing, at touch-down.

(b2) The yaw pointer is controlled from the ILS receiver by the LOC BEAM ERROR signal. This signal is damped by a YAW RATE signal and the COURSE SET ERROR signal, which is limited to 3 degrees.

A YAW BAR REMOVAL logic signal cancels the yaw pointer command signal when the FD is not engaged in the RUNWAY GUIDANCE phase. Runway guidance logic is dealt with in paragraph 5. G.

(c) Relay jack inner loop.

(c1) Before engagement

To avoid any abrupt movement of the aircraft on AP engagement, the inner loop must be synchronized with control surface position. This fast synchronization is carried out by integrators which provide feedback to the output amplifiers.
The C6 and C9 level switches inhibit engagement if the AP output command is greater than 0.5° control surface deflection.
The relay jack vibrator (dither) is not active.

(c2) On engagement

The threshold of the level switches is increased to 2 degrees and the AP is automatically disconnected if the difference between the control order and the position return is greater than 2 degrees for more than 150 ms.

The synchronization integrators change to slow synchronization and discharge into the output amplifiers with a slow time constant (10 seconds).

The relay jack vibrator is active and is used to improve relay jack servovalve performance.

Gain changes are controlled by a MACH NUMBER signal generated by the ADC.

The control signal (Φc) is limited to 30 degrees except when the TURN knob on the AFCS datum adjust unit is operated, when it can reach 35 degrees.
In LAND mode the limit is a linear function of altitude. It varies from 30 degrees at 1500 ft. to 4 degrees at 68 ft.

The bank rate is limited to 5 degrees per second, exception in TRK/HDG modes and in the CONE ARM phase of the VOR mode, when it is limited to 2.5 degrees per second.

The lateral acceleration signal permits reduction of yaw caused by an engine failure detected by detector C19 (Ref. LAND mode operation).

(3) Monitoring

These channels are monitored by the use of monitored duplicated computation channels, with a comparison between the two channels.
This comparison is carried out at several points, called consolidated points.
These comparators are situated so that their threshold is affected only by the drift of four or five amplifiers. This allows a comparison with very low monitoring thresholds.

Comparators C5, C6, C9 and C10 are active whatever mode is engaged.

- C5 monitors the roll inner loop.

- C6 monitors the input to the roll relay jack.

- C9 monitors the input to the yaw relay jack.

- C10 monitors the yaw inner loop.

Comparators C1, C2, C3, C4, C7, C8 and C12 are active only in approach.

- C1 monitors VOR/LOC radio data. It is active in LOC TRK in AP LOC or LAND mode.
- C2 monitors the roll integrator. It is active in LOC TRK in AP LOC or LAND mode.
- C3 monitors Φc data before the limiter. It is active in LOC TRK phase in AP LOC or LAND mode.
- C4 monitors Φc data after the limiter. It is active in LOC TRK in AP LOC or LAND mode.
- C7 monitors FD roll control. It is active in FD LOC TRK phase.
- C8 monitors FD yaw control. It is active in FD LOC TRK phase.
- C12 monitors the COURSE SET signal in DECRAB phase. It is active in LOC TRK in AP LAND mode only.

4. Sensors - Roll and Yaw Relay Jacks (R & Y RJS)

A. Description
(Ref. Fig. 002)

The roll and yaw relay jack sensors generate position return signals of the roll relay jack (for R. RJS) and of the yaw relay jack (for Y. RJS).

The two relay jack sensors are identical.
Relay jack extension is transmitted via a trailing link which drives four synchros (two control and two monitoring) via a gear train contained in a drive housing.

The relay jack has a normal extension of ± 16 in. (± 40 mm) which corresponds to ± 15 degrees of lever assembly angle and ± 30 degrees of synchro rotation.
A transit support brace is fitted for transit.

An adjustment device can be used to modify the input lever geometry and so to adjust the electrical zero of the four synchros simultenously. Adjustment is necessary only if there is a discrepancy between the relay jack position when pinned at the flight controls neutral position and the synchros which are set to a standard model before installation on the aircraft.

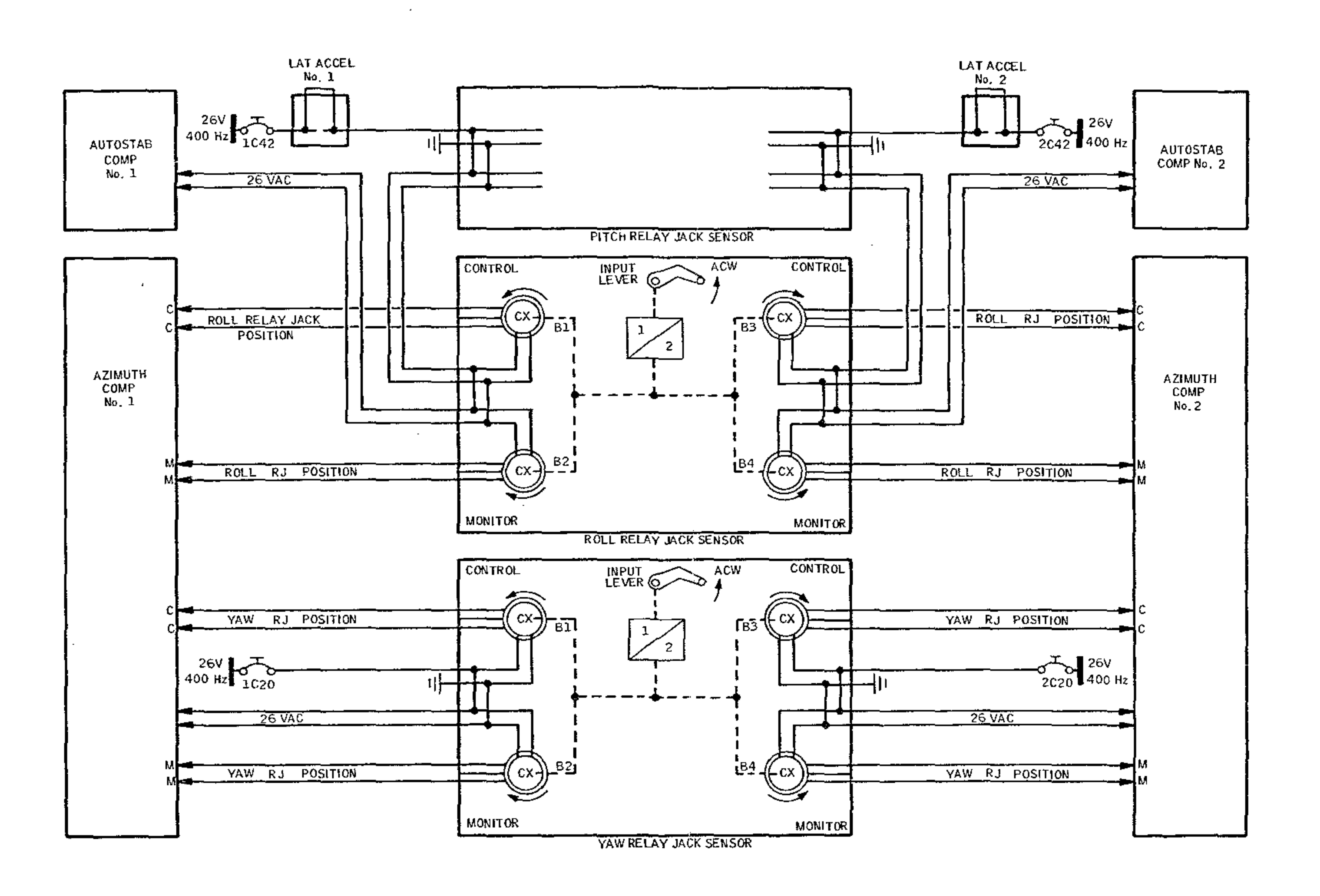
B. Operation (Ref. Fig. 009)

The relay jack position AC output signals are routed to the appropriate autopilot channels.
The wiring to synchros B1 and B2 (channel 1) is isolated from the wiring to synchros B3 and B4 (channel 2). Segregation is acheived by using electrical connectors (PA for channel 1 and PB for channel 2).

The roll RJS synchros are supplied with 26VAC 400 Hz through autostabilization system circuit breakers.
Circuit breaker 1C42 supplies synchros B1 and B2 on channel 1.
Circuit breaker 2C42 supplies synchros B3 and B4 on channel 2.
The autostabilization computer monitors supply to its lateral accelerometer and supply to the pitch RJS and roll RJS. A break in the wiring or a bad connection inhibits autostabilization engagement, and thus AP/FD engagement.

The yaw RJS synchros are supplied with 26VAC 400 Hz through AP/FD system circuit breakers.
Circuit breaker 1C20 supplies synchros B1 and B2 on channel 1.

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CMA 22 13 00 0 ALMO

Roll and Yaw RJS Circuit Diagram
Figure 009

Circuit breaker 2C20 supplies synchros B3 and B4 on channel 2.

The azimuth and pitch computers monitor yaw RJS supply. A break in the wiring or a bad connection inhibit autostabilization engagement, and thus AP/FD engagement.

5. Operation

A. HDG HOLD Mode

(1) Mode logic (Ref. Fig. 010)

The HDG HOLD mode signal is coded, stored and decoded to obtain the mode engagement signal (HDG HOLD push-button on AFCS control unit illuminates) in the following six cases :

(a) On mode selection (pressing corresponding push-button) the selection signal passes through a push-button anti jam circuit.

NOTE : When HDG HOLD mode is engaged with VOR/LOC mode primed the VOR/LOC prime indicator light can be extinguished by pressing the HDG HOLD push-button again.

(b) As soon as the TURN knob on the AFCS datum adjust unit is operated, except in LAND ENGAGED phase (LAND mode selected and LOC captured) or when GO AROUND mode is engaged.

(c) On selection or engagement of a pitch mode, with TURB mode engaged.

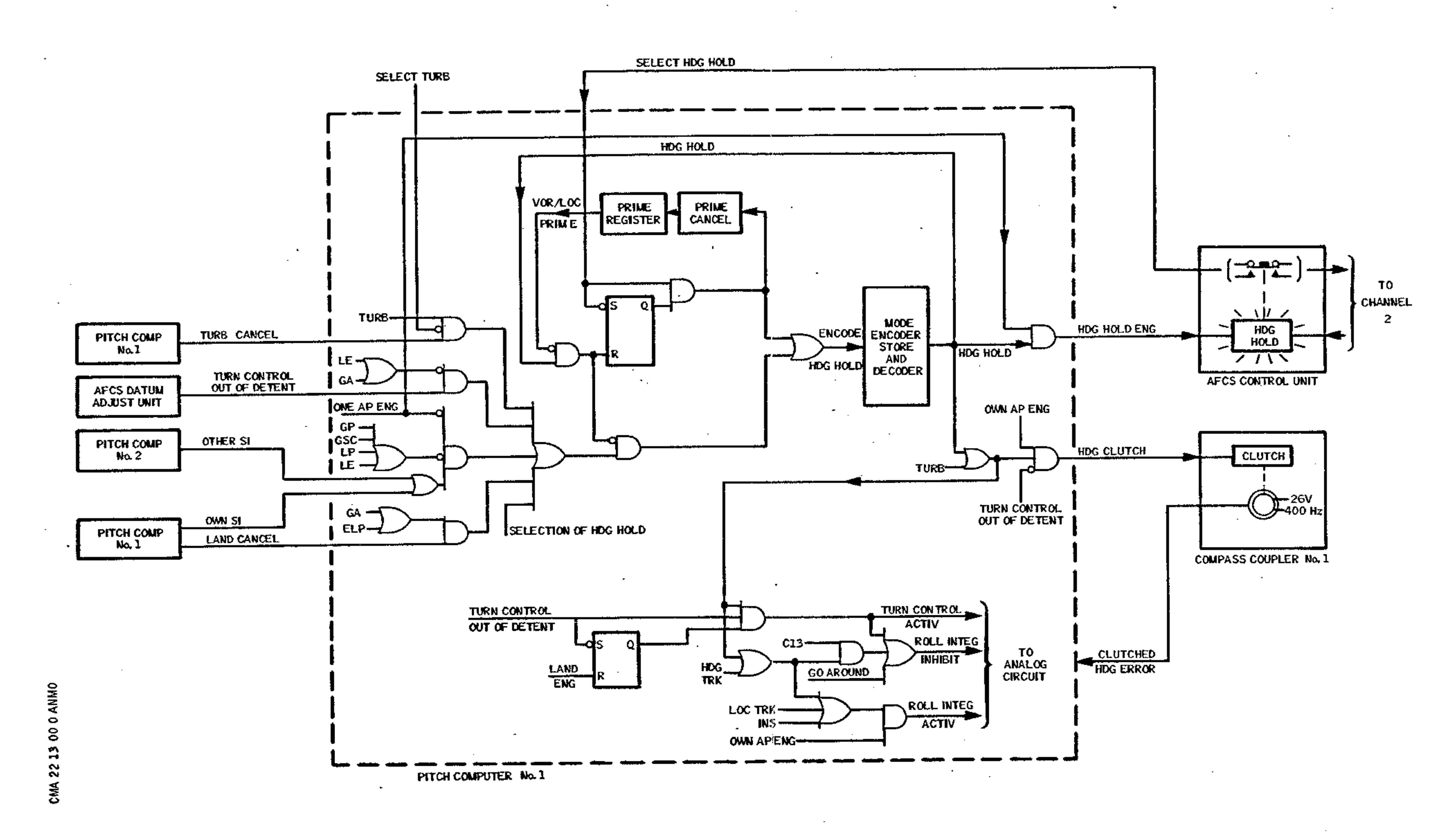
NOTE : In the pitch computer, the EXT MODE signal produced when TURB mode is engaged is lost when a pitch mode is engaged. Loss of the EXT MODE signal causes the TURB CANCEL signal to be generated. This signal is sent to the azimuth computer, where it automatically selects the HDG HOLD mode. Engagement of the HDG HOLD mode automatically cancels the TURB mode.

(d) On engagement of an AP (with neither previously engaged), except in the case where a FD is already in an approach mode, either primed or engaged.

(e) On generation of the LAND CANCEL signal, when the LAND mode is primed or engaged or when the GO AROUND mode is engaged.

NOTE : The LAND CANCEL signal is generated by the pitch computer when the PITCH HOLD mode is selected.

(f) On generation of the NO FUNCTION ENGAGED signal



HDG HOLD Logic
Figure 010

(neither AP and neither FD engaged).

NOTE : The HDG HOLD mode is coded, stored and decoded but only becomes active on engagement of an AP (when the HDG HOLD pushbutton illuminates).

(2) Heading synchro clutch signal logic
(Ref. Fig. 010)

When HDG HOLD or TURB mode is engaged the HDG CLUTCH signal is sent to the compass coupler associated with the AP engaged, causing the heading synchro to be clutched at its electrical zero position.
As soon as the TURN knob leaves its neutral position, i.e. is out of detent (turn control), the synchro is declutched. When the knob returns to its neutral position the synchro is clutched at the new heading.

(3) TURN CONTROL ACTIV signal

This signal, used in the analog channel (see following paragraph), is generated as soon as the TURN knob leaves its neutral position with the AP engaged in HDG HOLD or TURB mode. The TURN knob has no effect when LAND mode is engaged.

(4) Roll integrator activation logic

The roll integrator situated on the analog channel is active as soon as one AP is engaged in one of the following modes : HDG HOLD, TURB, HDG/TRK, INS or LOC in TRACK phase (LOC TRK).

The integrator is inhibited as soon as the TURN knob is operated, or on engagement of the GO AROUND mode, or in HDG HOLD, TURB or HDG/TRK modes when the heading error signal is greater than a set value. (This monitoring is carried out by level switch C13, situated on the analog channel).

(5) HDG HOLD analog channel (Ref. Fig. 011)

This mode makes use of two control signals :

The CLUTCHED HDG ERROR signal, which is generated in the compass coupler by a clutchable synchro. On AP engagement the synchro is clutched at the detector output electrical zero by the HDG CLUTCH signal. This signal therefore delivers an error signal (aircraft heading minus heading on engagement). Any heading error

CMA 22 13 00 0 AQMO

COMPASS COUPLER No. 1
CLUTCHED HDG ERROR
DEMOD
HDG HOLD OR TURB
0.5 1
TURB
HDG HOLD
LEVEL SW C13
2.5° HDG
C13 TO LOGIC
G
3.5
0.75
0.25 2.5 M
QC
AFCS DATUM ADJUST UNIT
BANK DEMAND
DEMOD
TURN CONTROL ACTIV
OUTER LOOP
ROLL INTEG ACTIV
INT
HDG HOLD OR TURB
ROLL INTEG INHIBIT
ØC LIMIT
LIMITER
HDG HOLD OR TURB
TURN CONTROL ACTIV
30° 35°
INNER LOOP

AZIMUTH COMPUTER No. 1

HDG HOLD and TURB Outer Loop
Figure 011


EFFECTIVITY: ALL

R BA

is converted into degrees of control surface deflection and cancelled by the calculation channel.

The BANK DEMAND signal is provided by the AFCS datum adjust unit TURN knob. The synchro associated with this knob generates a linear output signal which is used to bank the aircraft up to a maximum bank angle of 35 degrees.

These two signals are not exploited at the same time.

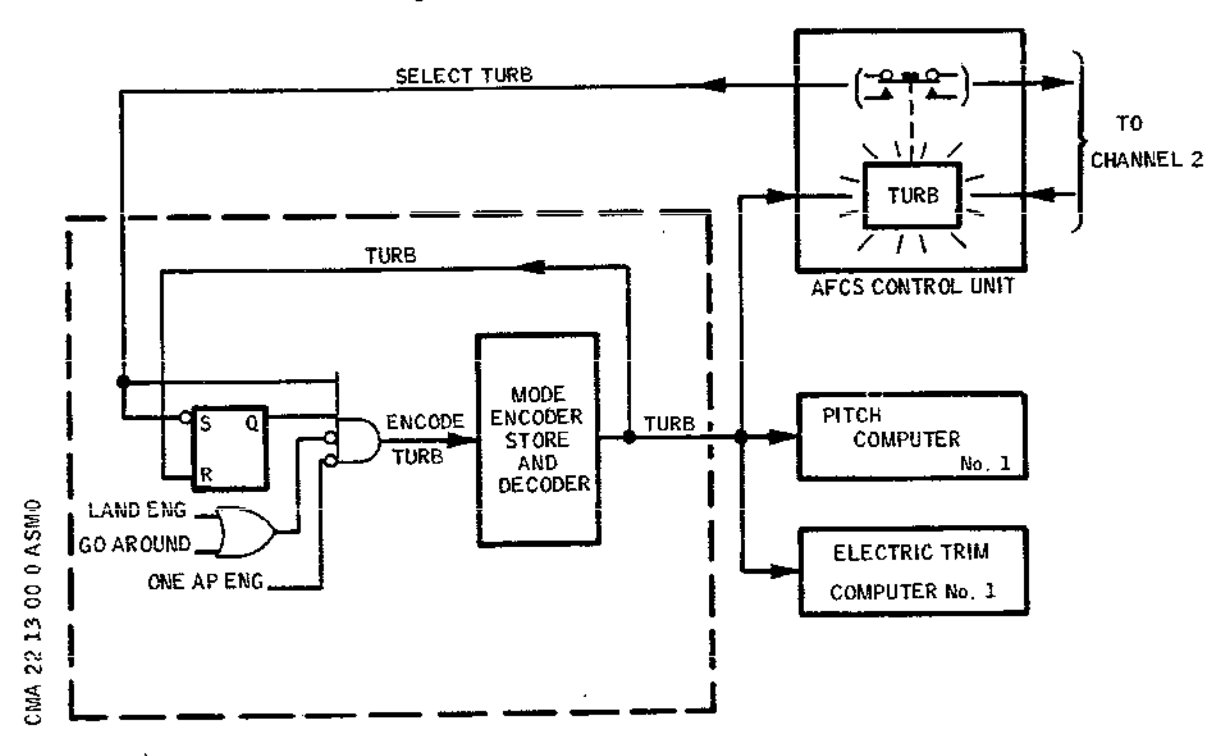
The CLUTCHED HDG ERROR signal is demodulated, then applied to the input of a gain change circuit, the output of which is a function of mach number. This demodulated signal is also sent to a level switch which is used to activate the roll integrator. This integrator allows any long duration error in the system to be cancelled and is effective only for small heading errors, i.e. less than 2.5 degrees. The integrator output is connected to the output of a limiter.

When a bank command is produced by the TURN knob the switching logic acts on an electrical switch, so sending the signal to the summer.
The roll integrator is inhibited.

These two signals are dealt with in the same way in the inner loop (Ref. paragraph 3. F.).

B. TURB Mode

(1) Mode logic (Ref. Fig. 012)



TURB Logic
Figure 012

This mode engages on selection (pressing corresponding push-button) as long as one AP is engaged. Engagement of this mode causes the FD to disengage, if this was previously engaged.

This mode will not engage when the AP/FD is in LAND mode after LOC capture (LAND ENG) or in GO AROUND mode.

The TURB signal is sent to the pitch computer to switch the analog channels to TURB mode (Ref. 22-12-00, Description and Operation, paragraph 5. B.).
It is also sent to the electric trim computer to reduce the pitch trim operation rate (Ref. 22-23-00, Description and Operation).

This mode can be cancelled by selecting any azimuth or

pitch mode. In this case the AP automatically returns to the basic mode on the other channel.

(2) TURB analog channel
(Ref. Fig. 011)

This mode uses the same CLUTCHED HDG ERROR signal as the HDG HOLD mode; however the gain of this signal is halved.

C. TRK/HDG Mode

(1) Mode logic

This mode engages on selection (pressing corresponding push-button) in either the AP or the FD.

This mode cannot be engaged when the AP/FD is in LAND mode after LOC capture (LAND ENG) or in GO AROUND mode.

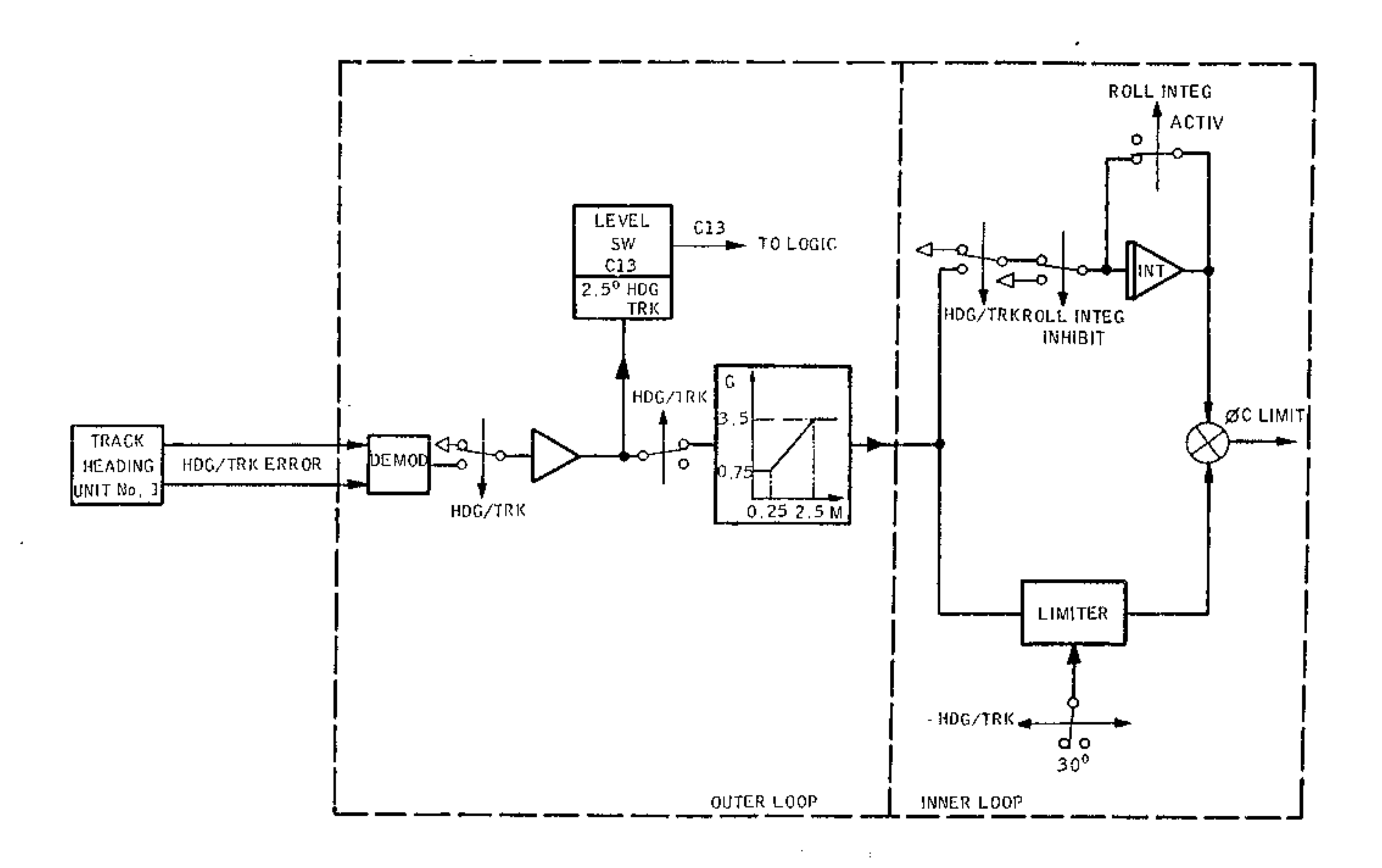
When this mode is engaged the HSI COMPASS FLAG logic signal generated in the track heading unit must be healthy (+ 28VDC) for the AP/FD to remain engaged (Ref. 22-10-00, Description and Operation, paragraph 3. G.).

(2) HDG/TRK analog channel (Ref. Fig. 013)

This mode makes use of the HDG/TRK ERROR control signal generated in the track heading unit (Ref. 22-10-00, Description and Operation, paragraph 3. G.).
This signal is demodulated, then applied to the input of a gain change circuit, the output of which varies as a function of track number.
The roll interrogator is inhibited when the error signal is greater than 2.5 degrees.

NOTE : The full time command modifier (FTCM) limits control signal variation to 2.5 degrees per second (Ref. relay jack inner loop).

CMA 22 13 00 0 AUMO



HDG/TRK Outer Loop
Figure 013

EFFECTIVITY: ALL

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D. INS Mode

(1) Mode logic

This mode engages on selection (pressing INS push-button) as long as the AP or FD is not in LAND mode after LOC capture (LAND ENG) or in GO AROUND mode. In these cases the INS push-button does not illuminate and the AP/FD remains in LAND ENG or in GO AROUND mode.

Faults in this mode result in AP/FD disconnection due to the presence of the HSI FAIL WARNING signal.

(2) INS analog channel (Ref. Fig. 014)

The inertial navigation system generates a control signal (STEERING SIGNAL). This signal is demodulated, then applied to the input of a fixed gain amplifier.

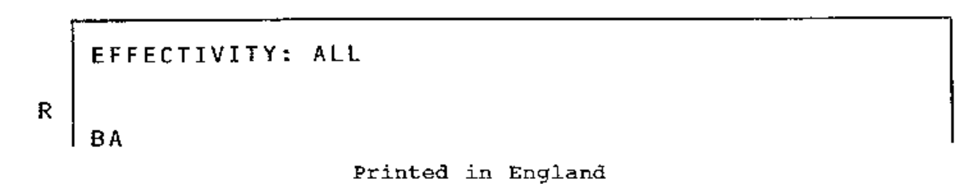
Level switch C13 inhibits the roll integrator when the steering signal is greater than 9 degrees and reactivates it when the steering signal is less than or equal to 5 degrees.

From here the calculation channel is identical to that of the modes described above.

CMA 22 13 00 0 AWMO

INS 1
STEERING SIGNAL
DEMOD
INS
INS
LEVEL SW
C13
5° STEERING
9° SIGNAL
C13
TO LOGIC
G = 0.75
ϕC
INS
ROLL INTEG
ACTIV
ROLL INTEG
INHIBIT
INT
ϕC
LIMIT
LIMITER
INS
30°
OUTER LOOP
INNER LOOP
AZIMUTH COMPUTER No. 1

INS Outer Loop
Figure 014


EFFECTIVITY: ALL

R BA

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E. VOR Mode

(1) VOR PRIME logic (Ref. Fig. 015)

The VOR PRIME signal is generated (illumination of prime indicator light under VOR/LOC push-button) on selection of the VOR/LOC, GLIDE or LAND mode, as long as the AP or FD is not in the GO AROUND mode.

The selection signal goes through an anti jam circuit.

(2) VOR ENG logic
(Ref. Fig. 015)

The VOR mode is active (illumination of VOR/LOC push-button) when the engagement conditions (VOR ENG CONDITION signal) and the VOR PRIME signal are present.

On VOR mode engagement (VOR ENG) the VOR prime indicator light extinguishes and the azimuth mode previously engaged disengages.

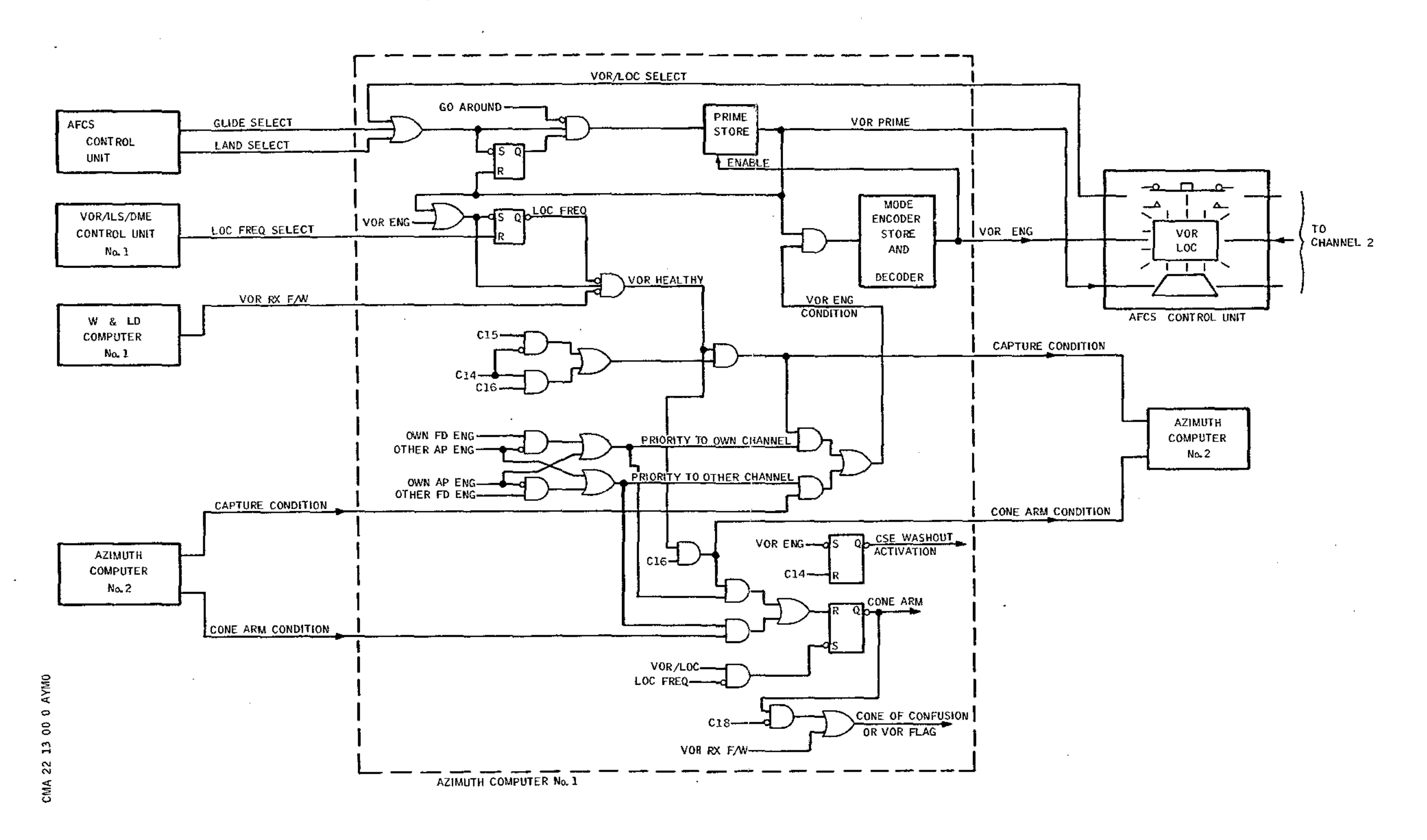
The VOR ENG CONDITION signal is generated when the level switches on the analog channel determine capture and the logic considers the VOR mode to be healthy (VOR HEALTHY signal).
Capture is acheived when the angle of interception (COURSE SET ERROR signal) is less than 15 degrees (detected by C14) and the VOR BEAM ERROR signal is less than 24 µA (detected by C16). When the angle of interception is greater than 15 degrees capture is obtained when the roll angle is greater than 10 degrees (detected by C15).

The VOR mode is considered to be healthy when the VOR PRIME signal is present, no LOC frequency has been selected and there is no fault in the VOR receiver.

NOTE : The VOR receiver validity signal passes through the W & LD computer and the RAD/INS switch (Ref. 22-10-00, Description and Operation, paragraph 3. J.).

(3) CSE WASHOUT ACTIVATION logic
(Ref. Fig. 015)

This signal is generated when the COURSE SET ERROR signal is less than 15° (detected by C14) with the VOR mode engaged. The signal remains active until the VOR mode is lost (on engagement of another azimuth mode or of a common mode).



Logic Associated with VOR Mode
Figure 015

(4) CONE ARM logic
(Ref. Fig. 015)

The CONE ARM phase is initiated by level switch C16 when the VOR BEAM ERROR signal is less than 24 microamps with the VOR mode engaged (and already captured).

NOTE : The CONE ARM phase is also initiated in the non-active channel. This channel can therefore assume control of the aircraft quickly in this mode if the other channel is no longer in control.

(5) CONFUSION CONE logic
(Ref. Fig. 015)

The CONFUSION CONE phase is initiated by level switch C18 when the VOR BEAM ERROR signal variation rate is greater than 8 microamps per second for 18 seconds, with the CONE ARM phase already initiated.

(6) VOR analog channel (Ref. Fig. 016)

This mode makes use of two control signals :

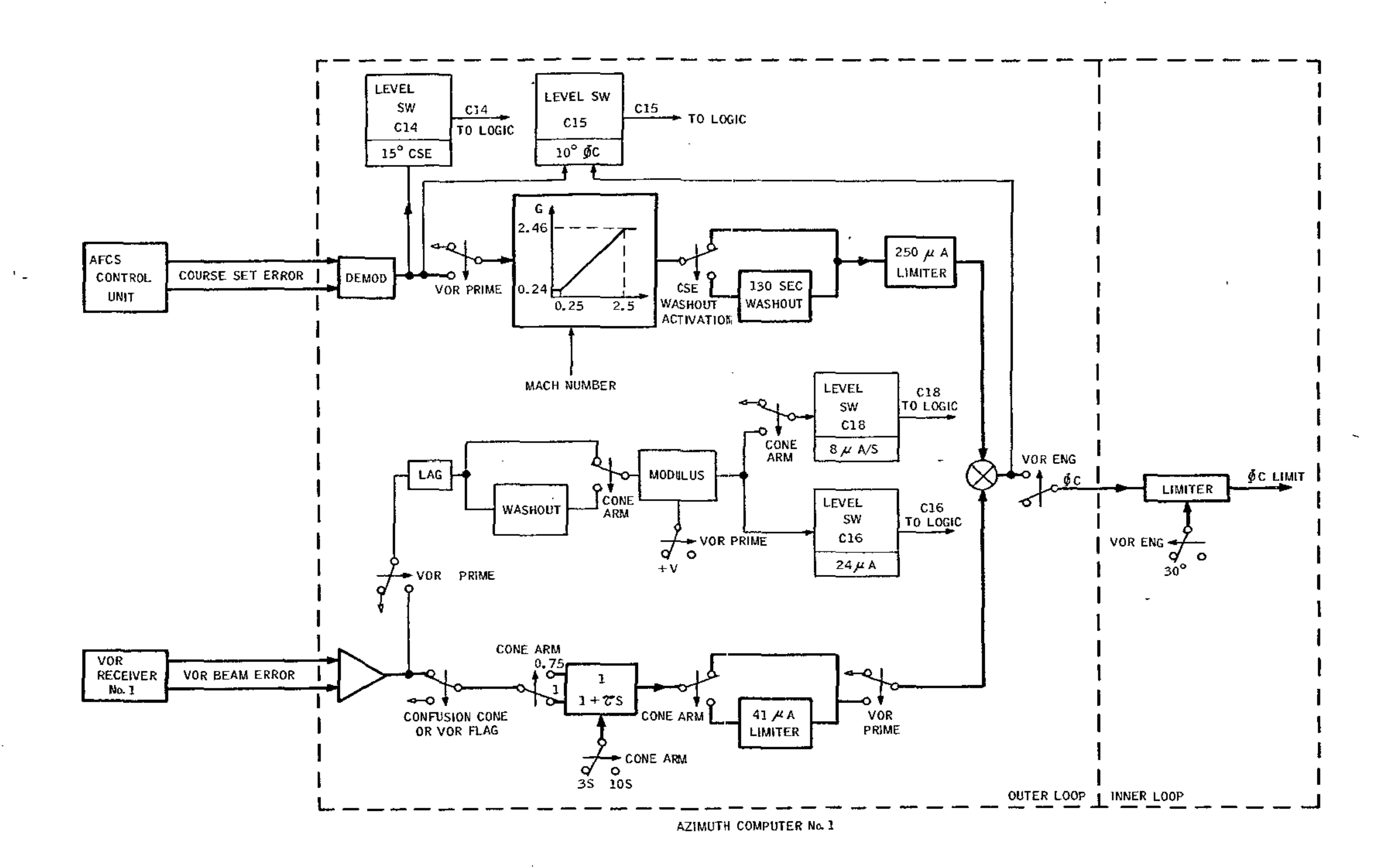
The VOR BEAM ERROR signal, which represents the difference between the actual heading and the desired heading and is generated by the VOR receiver. The VOR receiver generates this signal using the following input data :
The VOR frequency selected (corresponding to the VOR station towards which the pilot evants to head).
The angular deviation information provided by a resolver in the AFCS control unit associated with the VOR/LOC push-pull knob.

The COURSE SET ERROR signal, which represents the difference between the aircraft heading and the desired heading, set on the AFCS control unit by the VOR/LOC push-pull knob.

NOTE : There are two other synchros associated with the VOR/LOC push-pull knob ; one is for the LOC mode (monitoring channel) and the other is used to move the VOR or LOC pointer for the course to be followed (Ref. 22-11-00, Description and Operation, paragraph 2).

These two signals are used at the same time, on capture.

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CMA 22 13 00 0 BAMO

VOR Outer Loop
Figure 016

When the COURSE SET ERROR signal is less than 15° it is no longer used by the analog channel ; only the VOR BEAM ERROR signal is used for aircraft guidance.

At CONFUSION CONE phase initiation the VOR BEAM ERROR signal is also cancelled, the roll control signal is zero, and the aircraft continues on its existing heading.

On leaving the confusion cone the VOR BEAM ERROR signal is once again taken into account.

NOTE : In the CONE ARM phase the FTCM limits the signal variation to 2.5 degrees per second (Ref. relay jack inner loop).

F. LOC Mode

(1) LOC PRIME logic (Ref. Fig. 017)

The LOC PRIME signal is generated (illumination of prime indicator light under VOR/LOC push-button) on selection of the VOR/LOC GLIDE or LAND mode, as long as the AP or FD is not in GO AROUND mode.
The selection signal goes through an anti jam circuit.
The LOC prime indicator light extinguishes in the following five cases :

- on LOC mode engagement.
- on LAND mode engagement
- on HDG HOLD mode engagement
- on loss of both APs and both FDs
- on engagement of one AP (neither being previously engaged), except if one FD is already in LAND or GLIDE mode, primed or engaged.

(2) LOC ENG logic
(Ref. Fig. 017)

The LOC mode is active (illumination of VOR/LOC push-button) when the engagement conditions (LOC ENG CONDITION signal) and the LOC PRIME signal are present.

The LOC ENG condition signal is generated when the level switches on the analog channel determine capture and the LOC mode is considered to be healthy (LOC HEALTHY signal).

Capture is obtained when the interception angle (COURSE SET ERROR signal) is less than 15 degrees (detected by C14) and the LOC BEAM ERROR signal is less than 100 microamps (detected by C16).
When the COURSE SET ERROR signal is greater than 15 degrees, capture is obtained when the roll signal is greater than 10 degrees (detected by C15).

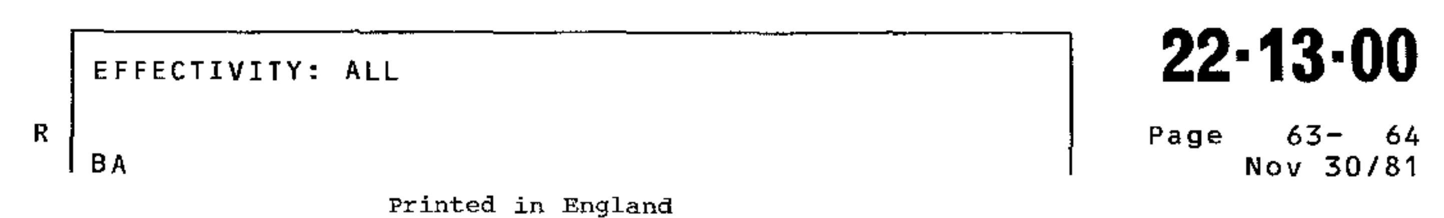
The LOC mode is considered to be healthy when it has been selected, the LOC PRIME signal is present, a LOC frequency has been set and the LOC receiver operates correctly.

NOTE : The LOC receiver validity signal passes through the W & LD computer and the RAD/INS switch (Ref. 22-10-00, Description and Operation, paragraph 3. K.).

LOC mode engagement causes the LOC PRIME signal to be

VOR/LOC SELECT
LOC ANTI JAM
LOC PRIMED
LOC ENCODING
GO AROUND
AFCS CONTROL UNIT
GLIDE SELECT
LAND SELECT
S Q R
PITCH COMP No. 1
OWN SI
LOC ENG
LAND ENG
HDG HOLD
NO FUNCTION ENG
LOC PRIME CANCEL
GLIDE OR LAND SELECT
ONE AP ENG
PITCH COMP No. 2
OTHER SI
ONE OTHER MODE ANTI JAM
NO FUNCTION ENG
LAND ENCODING
GO AROUND
LOC CANCEL
LAND ILL
GO AROUND
LOC ILL
VOR LOC
AFCS CONTROL UNIT
TO CHANNEL 2
AFCS CONTROL UNIT
TURN CONTROL OUT OF DETENT
LOCK ENG
LOC PRIMED
LAND PHASE
LOC HEALTHY
VOR/ILS/DME CONTROL UNIT
LOC FREQ SELECT
W&LD COMPUTER No. 1
LOC RX F/W
C15
C14
C16
CAPTURE CONDITION
OWN FD ENG
OTHER AP ENG
PRIORITY TO OWN CHANNEL
LOC OR LAND ENG CONDITION
OWN AP ENG
OTHER FD ENG
PRIORITY TO OTHER CHANNEL
AZIMUTH COMPUTER No. 2
CAPTURE CONDITION
LOC TRK CONDITION
LOC ENG
LOC FREQ
LOC TRK
COMPASS COUPLER No. 1
PRIORITY TO OTHER CHANNEL
PRIORITY TO OWN CHANNEL
M
LOC TRK CONDITION
AZIMUTH COMPUTER No. 2
LOC HEALTHY
THROTTLE SW
& AT NOT ENG
(SEE FIG 19)
C18
LOC ENG
CSE WASHOUT ACTIVATION
C14
AZIMUTH COMPUTER No. 1
CMA 22 13 00 0 BCM0

Logic Associated with LOC Mode
Figure 017


EFFECTIVITY: ALL
R
BA
Printed in England

cancelled and the azimuth mode previously engaged to be disengaged.

NOTE : When the LOC mode is engaged the CSE WASHOUT ACTIVATION signal is generated for use in the analog channel as soon as the COURSE SET ERROR signal is less than 15 degrees (detected by C14). This signal remains active unless the LOC mode is lost.

The LOC mode is cancelled in the following five cases:

- on engagement of on AP (neither AP previously engaged) except if one FD is already in LAND or GLIDE mode, primed or engaged.
- on engagement of another azimuth mode
- on engagement of LAND mode
- on loss of both APs and both FDs
- as soon as the TURN knob on the AFCS control unit is operated except in GO AROUND mode.

(3) LOC TRK logic
(Ref. Fig. 017)

The LOC TRK phase is initiated by level switch C18 when the LOC BEAM ERROR signal variation rate is less than 15 microamps per second for more than 18 seconds, with LOC mode already engaged (LOC beam captured).
When the LOC mode is engaged and the pilot carries out a GO AROUND manoeuvre (AT disconnect and at least two throttle control levers at max thrust position) the LOC TRK CONDITION is given directly by the THROTTLE SW and AT NOT ENG logic signal (Ref. GO AROUND mode logic).

The LOC TRK signal then produced is sent to the compass coupler which switches to directional gyro (DG) mode.

NOTE : In the LOC TRK phase the roll integrator on the analog channel is activated. (The roll integrator activation logic is dealt with in paragraph 5. A.).

(4) LOC analog channel (Ref. Fig. 018)

This mode makes use of two control signals :

The LOC BEAM ERROR signal which represents the difference between the aircraft heading and the runway axis, and which is generated by the ILS receiver.

INTENTIONALLY BLANK

DEMOD
GSC &
LOC TRK
60 SEC
WASHOUT
LOC TRK
22 SEC
LAG
INS No. 1
ROLL ATTITUDE
DEMOD
AUTOSTAB
COMP No. 1
LAT ACCELERO
GSC &
LOC TRK
60 SEC
WASHOUT
LOC TRK
22 SEC
LAG
COURSE SET ERROR
TO ADI INNER
LOOP
(FIG No. 8)
h < 600 ft
LOC ENG
LEVEL
SW
C14
15° CSE
C14 TO LOGIC
LEVEL
SW
C15
10° ØC
C15 TO LOGIC
C3
TO LOGIC
AFCS
CONTROL
UNIT
COURSE SET ERROR
DEMOD
LOC PRIME
G
1.36
0.66
11
25 μ A/S
CSE
WASHOUT
ACTIV
45 SEC
WASHOUT
LOC TRK
LAG
LOC TRK
250 μ A
LIMITER
h < 600 ft
Ø C
30°
LIMITER
Ø C LIMIT
LOC ENG
MODULUS
LAG
WASHOUT
MODULUS
LOC
PRIME
+V
LOC PRIME
LEVEL
SW C18
15 μ A/S
C18
TO LOGIC
LEVEL
SW C16
100 μ A
C16
TO LOGIC
WASHOUT
LOC
PRIME
G = 2.2
LOC ENG
150 μ A
LIMITER
LOC PRIME
GO AROUND
C1
TO LOGIC
G = 2.2
LOC ENG
150 μ A
LIMITER
ILS RECEIVER
No. 1
LOC BEAM ERROR
W&LD
COMPUTER
No. 1
LOC RXF/W
LOC TRK
ROLL INT
INHIBIT
INT
ROLL INT ACTIV
C2
TO LOGIC
AP IN STANDBY
ROLL AP DEMAND
TO RJ INNER LOOP
LOC TRK
ROLL INT
INHIBIT
INT
ROLL INT ACTIV
ANALOG CONTROL CHANNEL
ANALOG MONITORING CHANNEL

CMA 22 13 00 0 BEMO

LOC Outer Loop
Figure 018



The COURSE SET ERROR signal, which represents the difference between the aircraft heading and the runway heading set with the VOR/LOC push-pull knob on the AFCS control unit.

These two signals are used on LOC capture.

The COURSE SET ERROR signal is used until initiation of the LOC TRK phase to guide the aircraft towards the runway axis. The gain is a function of the LOC BEAM ERROR signal variation. If the LOC BEAM ERROR signal is less than 15 degrees it is cancelled (after 45 seconds) to eliminate deviation effects caused, for example, by a cross wind.

The LOC BEAM ERROR signal is used to guide the aircraft onto the LOC beam. It has a fixed gain (in LOC mode) and is limited to 150 microamps.

In the LOC TRK phase, initiated by level switch C18 the COURSE SET ERROR signal is replaced by a delayed (22 seconds) damping signal.
The lateral acceleration signal (generated by the autostabilization system lateral accelerometer), with a phase advance, is used to reduce any lateral dissymmetry.
The LOC BEAM ERROR signal is summed with a signal generated by the roll integrator to limit the control signal at initiation of this phase.

The control signal thus produced (Φc) is limited to 30 degrees.

Comparators C1, C2 and C3 monitor the LOC TRK phase and produce AP disconnection if the difference between the control and monitoring signals exceeds their threshold.

C1 monitors the LOC BEAM ERROR signal
C2 monitors the roll integrator
C3 monitors the Φc signal before the limiter.

G. LAND Mode
(Ref. Fig. 019)

(1) LAND PRIME logic

The LAND PRIMED signal is generated (illumination of prime indicator light under LAND push-button) on LAND mode selection.

NOTE : LAND mode selection generates the LOC PRIMED signal (illumination of VOR/LOC prime indicator light) and the ENTER LAND PHASE signal used by the pitch computer to illuminate the GLIDE prime indicator light.

The LAND prime indicator light extinguishes in the fol-fowing five cases :

- on LAND mode engagement
- on HDG HOLD mode selection
- on LOC mode selection
- on loss of both FDs and both APs
- in presence of LAND CANCEL signal generated by the pitch computer (generated on selection of HDG HOLD basic mode).

(2) LAND ENG logic

The LAND mode engages when the engagement conditions are present (LAND ENG CONDITION signal) and the mode is already primed. The engagement conditions were dealt with in the description of the LOC mode logic.

The LAND ENG signal is cancelled in the following four cases :

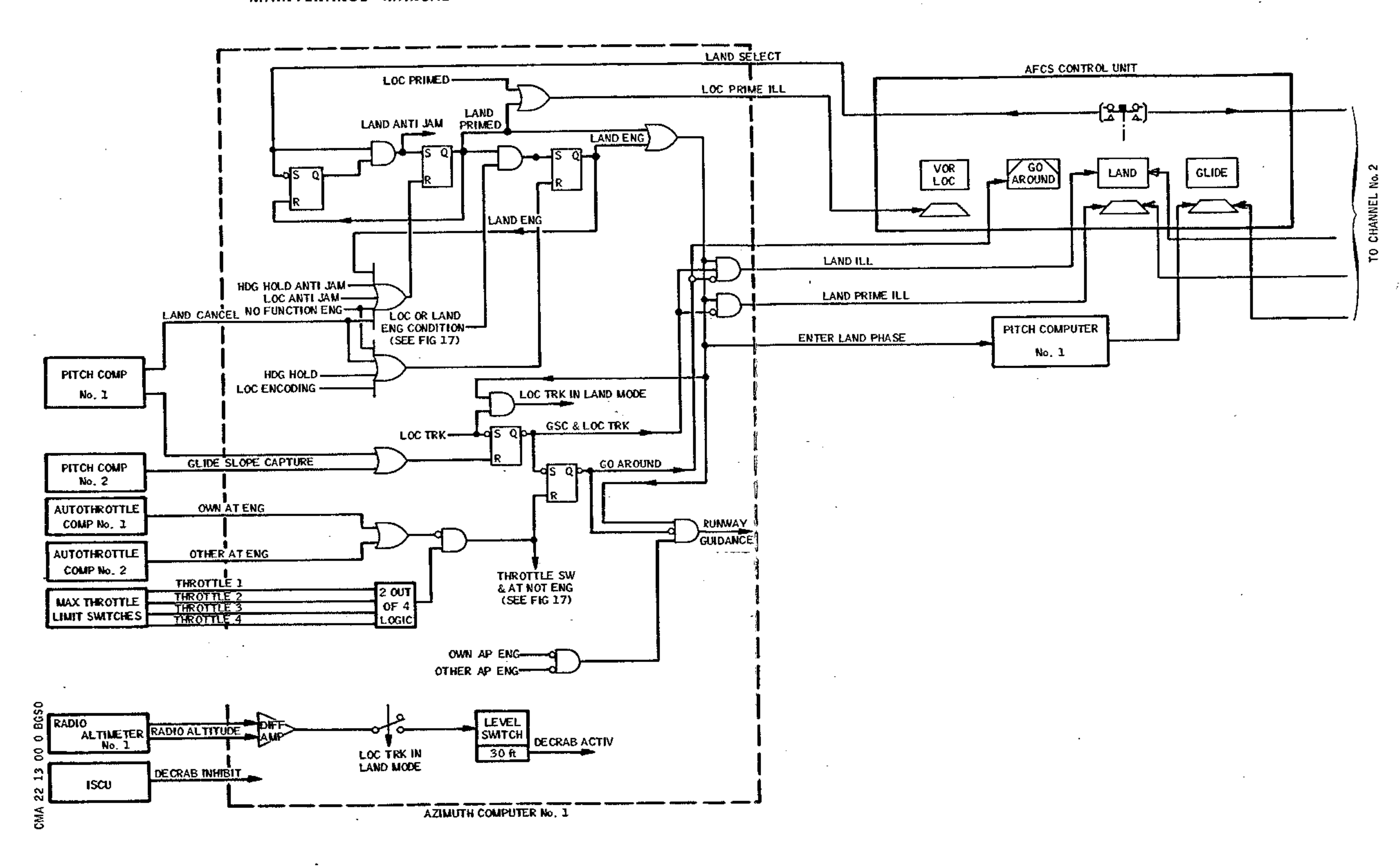
- on loss of both APs and both FDs
- on generation of LAND CANCEL signal
- on HDG HOLD mode engagement
- on LOC mode engagement

NOTE : With the LAND mode engaged, the LAND push-button will only illuminate after GLIDE CAPTURE and LOC TRK (GSC & LOC TRK). It extinguishes on engagement of GO AROUND mode.

(3) GSC & LOC TRK logic

This signal is generated using two input signals :

- the LOC TRK signal, generated in the azimuth compu-



Logic Associated With LAND Mode
Figure 019

ter (Ref. logic associated with LOC mode)
- the GSC signal, generated in the pitch computer.

The signal remains active if the GSC signal is lost ; it is cancelled only if the LOC TRK signal is lost.

(4) GO AROUND logic

If no autothrottle is engaged, and at least two throttle control levers are in maximum thrust position the THROTTLE SW & AT NOT ENG signal is generated. This automatically engages the GO AROUND mode if it is generated during the GSC & LOC TRK phase.

This mode remains engaged unless the GSC & LOC TRK signal is lost, i.e. unless the LOC TRK signal is lost (HDG HOLD mode selected).

NOTE : The THROTTLE SW & AT NOT ENG signal generates the LOC TRK CONDITION signal directly. Thus the pilot can perform a GO AROUND manoeuvre immediately after GLIDE slope capture.

(5) DECRAB logic

The DECRAB phase engages at 30 ft. by a radio altimeter contact if the LAND mode is engaged in LOC TRK phase.

The inertial signals comparator unit (1SCU) causes the DECRAB phase to be lost when there is a difference of more than 3 degrees 51 minutes between the two runway headings selected with the VOR/LOC push-pull knobs on the AFCS control unit.

(6) RUNWAY GUIDANCE logic

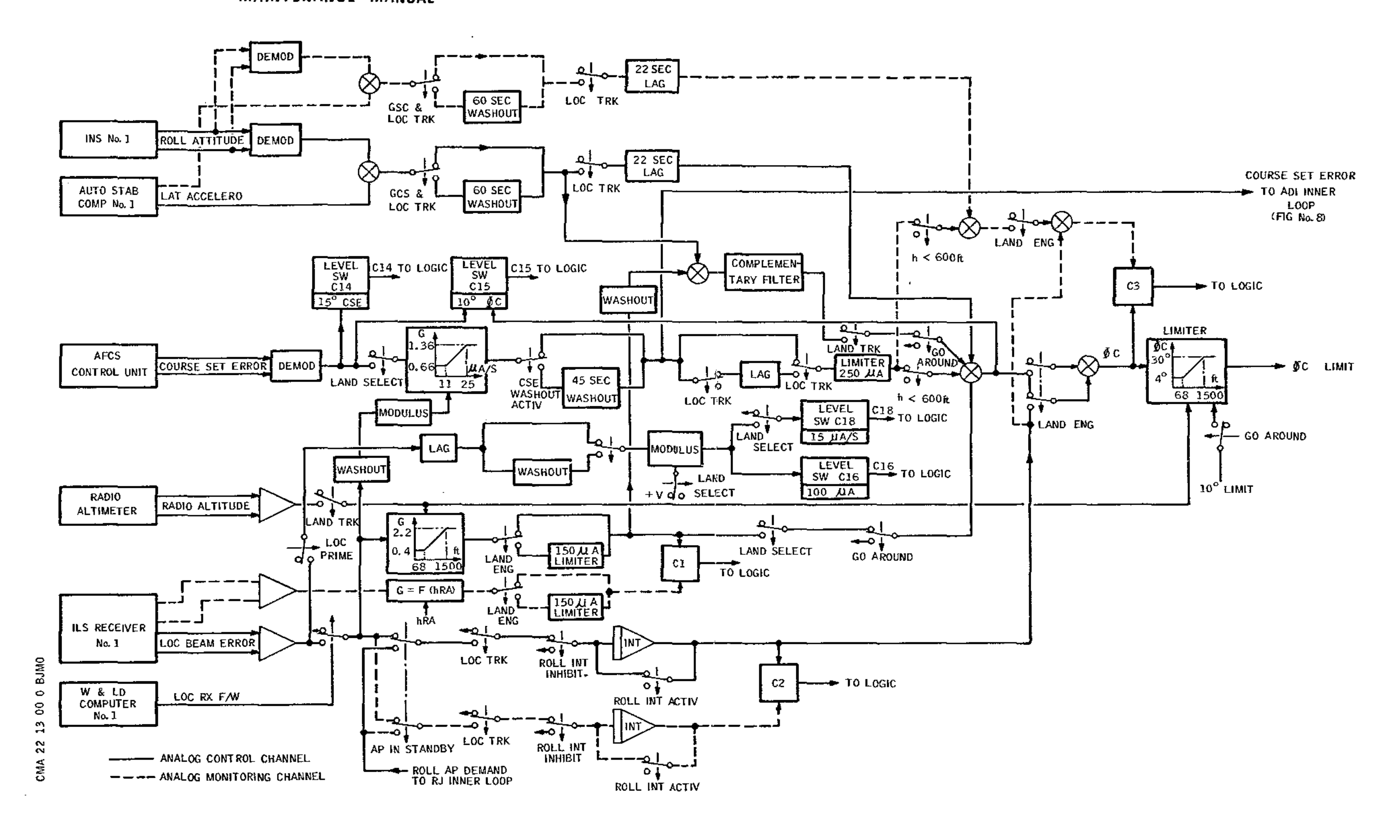
The RUNWAY GUIDANCE phase is initiated on disconnection of both APS (FD only engaged), when approached is carried out in LAND mode. The yaw pointer is only controlled below a height of 100 ft. as the W & LD system only authorizes it to appear below this height (Ref. 22-41-00, Description and Operation, paragraph 5. B. (9)).

This phase is cancelled if GO AROUND mode is engaged.

(7) LAND analog channel (Ref. Fig. 020)

The LAND mode uses the same control signals as the LOC mode (LOC BEAM ERROR signal generated by ILS receiver and COURSE SET ERROR signal generated by AFCS control

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LAND Outer Loop
Figure 020

unit) until the LOC TRK phase.

After LAND TRK (LOC TRK in LAND) the gain of the LOC BEAM ERROR signal varies as a function of radio altitude. The Φc control signal also varies, between limits, as a function of radio altitude.

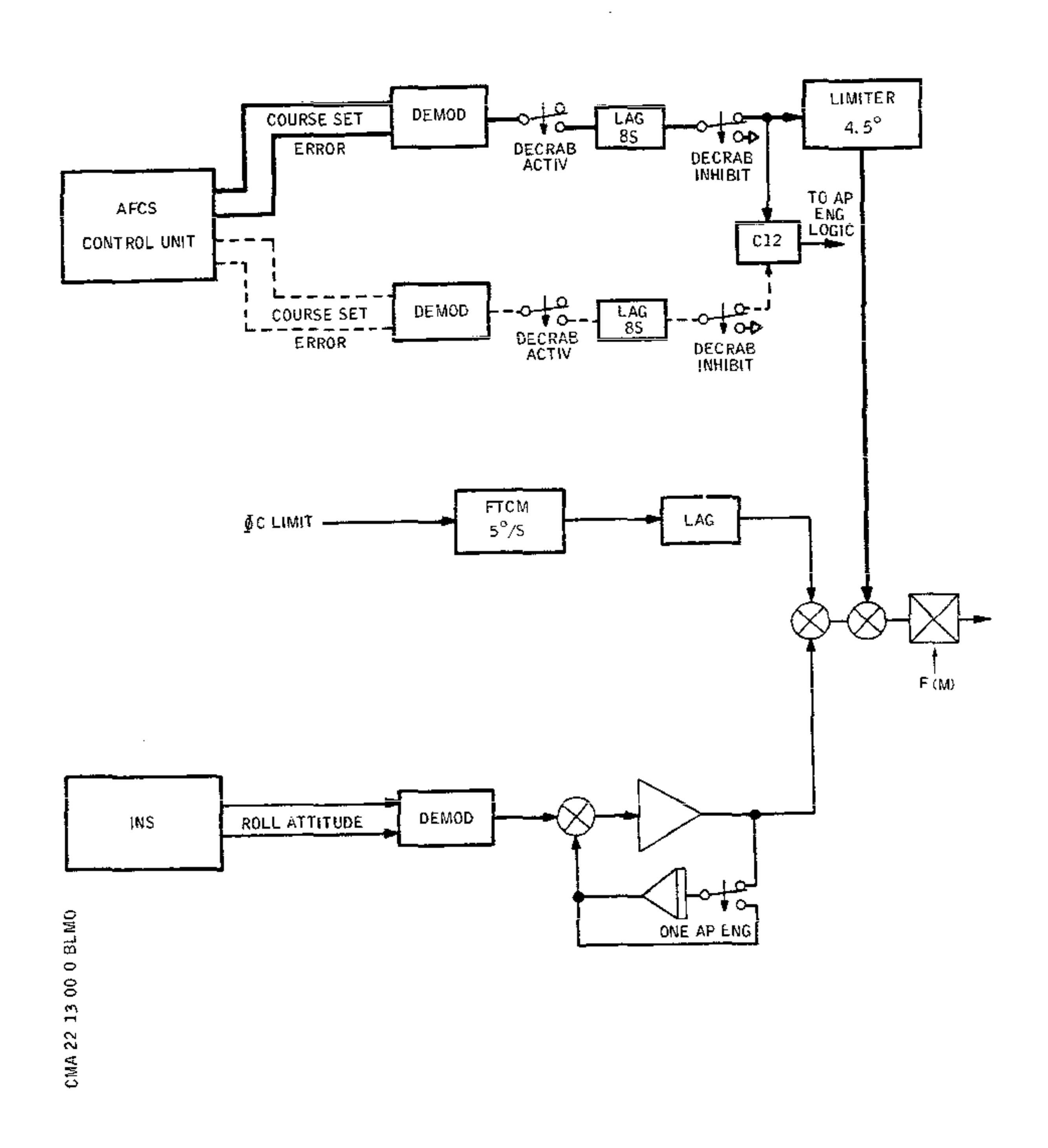
After LAND TRK an additional beam rate signal improves stability on the LOC beam. This signal is produced by complementary filtering washed out beam error and roll attitude.

(8) DECRAB analog channel (Ref. Fig. 021)

This circuit operates upon LOC TRK in LAND mode. The decrab level switch receives the signal from the radio altimeter and trips when altitude is below 30 ft. (Ref. DECRAB logic).

At that time the COURSE SET ERROR signal is applied to the relay jack inner loop to compensate for the crab angle. A delay time constant of 8 seconds is introduced to co-ordinate the runway alignment manoeuvre with touchdown. To avoid too great a roll amplitude the DECRAB signal is limited to 4.5°.

Comparator C12 monitors the DECRAB signal and causes AP disconnection if the control signal differs from the monitoring signal by approximately the level of the threshold.



DECRAB Analog Channel
Figure 021

H. GO AROUND Mode
(Ref. Fig. 020)

On GO AROUND mode engagement (Ref. GO AROUND logic) the LOC BEAM ERROR signal is connected to ground and the roll integrator is no longer active.

The Φc control signal limiter is controlled by the radio altimeter. Φc is limited to 10 degrees, as against 30 degrees in LAND mode.

AZIMUTH CHANNEL - ADJUSTMENT/TEST

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

1. General

WARNING : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

The azimuth channel operational test includes :

- Test of AP/FD azimuth computers by means of the ITEM system
- Check of AP engagement, FD engagement and AP warning
- Check of datum adjust unit TURN knob
- Check of track and heading push-pull knobs
- Check of azimuth mode selection

For azimuth mode functional test, refer to 22-10-00, Adjustment/Test.

2. Operational Test

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.47 metres (14 ft. 8 in.)	

B. Prepare

(1) Check that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
COMPASS COUPLER SYS 1 SW SUP	1-213	1F 134	F14
RAD/INS 1ST PLT SW SUP		1F 26	G17
NOSE UC WEIGHT SW "A" SYS SUP		G 291	M16
LH UC WEIGHT SW "A" SYS SUP		G 292	M17
RH UC WEIGHT SW & DOWNLOCK "A" SYS SUP		G 295	M18
FD1/FD2 1ST PLT SW SUP		1C 27	Q13
AFCS TEST 1 28V SUP		1C 383	R12
1ST PLT ADC INST SUP	2-213	1F 75	B 3
ADC1 26V SUP		1F 78	A 2
LH UC WEIGHT SW & DOWNLOCK "B" SYS SUP	3-213	G 293	B 8
RH UC WEIGHT SW "B" SYS SUP	3-213	G 294	B 9
NOSE U/C W/SW "B" SUP		G 296	D 8
FD1/FD2 2ND PLT SW SUP	5-213	2C 27	A13
AFCS TEST 2 28V SUP	5-213	2C 383	F11
AFCS TEST 1 115V SUP	13-215	1C 384	D 6
PLT'S LT TEST SUP	15-215	L1001	E14
2ND PLT ADC INST SUP	13-216	2F 75	A14
ADC2 26V SUP		2F 78	F14
AFCS TEST 2 115V SUP		2C 384	F17
COMPASS COUPLER SYS 2 SW SUP	15-216	2F 134	A21
RAD/INS 2ND PLT SW SUP		2F 26	E21

(2) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(3) At Flight Engineer's station, on EQUIPMENT BAY COOLING

unit, make certain that electronics rack ventilation is operating.

(4) Set flight controls in Blue or Green electrical mode (Ref. 27-00-00, Servicing).

(5) Carry out the work preparation required for engagement of both AP's and both FD's (Ref. 22-10-00, Servicing).

(6) On instrument panels, place :

(a) Both RAD/INS switches in RAD position.

(b) Captain's COMP 1/COMP 2 switch in COMP 1 position.

(c) First Officer's COMP 1/COMP 2 switch in COMP 2 position.

(d) Captain's FD1/FD2 switch in FD1 position.

(e) First Officer's FD1/FD2 switch in FD2 position.

(7) On Captain's attitude director indicator (ADI), check that FD flag (red) does not mask FD1 marker.

(8) On First Officer's ADI, check that FD flag does not mask FD2 marker.

R (9) The aircraft must be on the ground, shock absorbers
R compressed.

R B WARNING : DO NOT ENGAGE AN AUTOPILOT WHEN THE AIRCRAFT
R B IS ON JACKS.

C. Test of AP/FD Azimuth Computers by Means of the ITEM System

NOTE : Test procedure being identical for each computer only computer No.1 test is described while information relating to computer No.2 is given in parentheses.

(1) On ceiling panel, on AUTOTHROTTLE unit, place the four isolation switches in ON position.

(2) On centre console, place the four throttle control levers in max. thrust position.

(3) At Flight Engineer's station, on ITEM control and indicator panel :

(a) Place side 1 (side 2) IFM-OFF-TEST selector switch in TEST position (this switch is of the pull-to-unlock type).

(b) Place FLIGHT-TEST ALL-TEST UNIT selector switch in TEST UNIT position.

(b1) ITEM indication must appear in window 3 (7) and TEST indication in window 4 (8).

(b2) ITEM system automatic test is then initiated and 3 minutes later approximately, readings must be :

- ITEM in window 3 (7)
- PASS in window 4 (8)

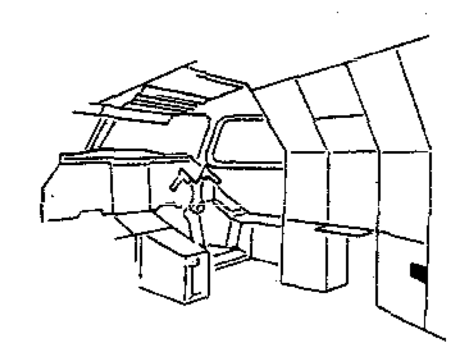
NOTE : If ITEM self test is ineffective, readings will be :

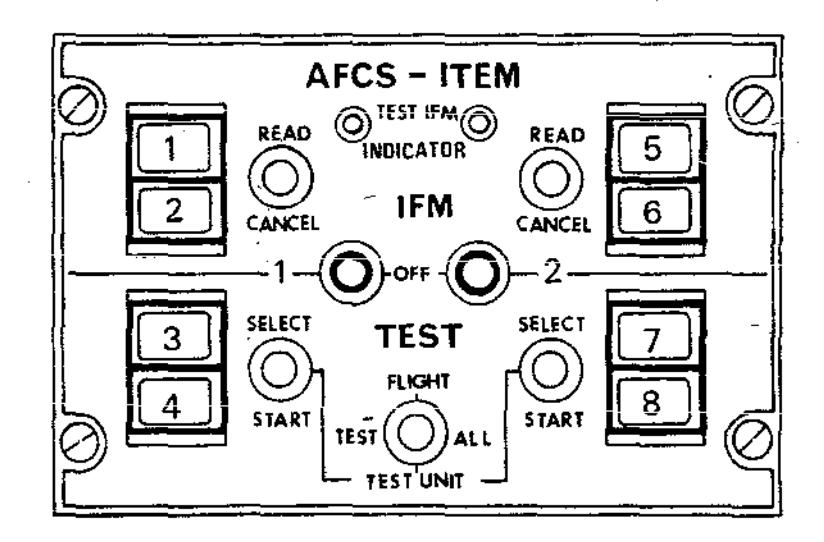
- ITEM in window 3 (7)
- FAIL in window 4 (8)

In such a case, test of AP/FD azimuth computer No.1 (No.2) cannot be carried out.

(c) Place and hold side 1 (side 2) SELECT-START switch in SELECT position, then release it when AP.A indication appears in window 3 (7).

NOTE : AFCS indications appear in the following sequence :





CMA 22 13 00 5 AAMO

Item Control and Indicator Panel
Figure 501

SFC, AP.P, AP.A, AT, AS.P, AS.R, AS.Y ET WLD in window 3 (7).

(d) Place side 1 (side 2) SELECT-START switch in START position, then release it.

(d1) AP/FD azimuth computer No.1 (No.2) test is initiated, the following indications must appear :

- AP.A indication in window 3 (7)
- TEST indication in window 4 (8)

(d2) And approximately 1 minute 30 seconds later :

- AP.A in window 3 (7)
- PASS in window 4 (8)

NOTE : If computer test is ineffective, readings will be :

- AP.A in window 3 (7)
- COMP or LAND in window 4 (8)

(e) Place side 1 (side 2) IFM-OFF-TEST switch in OFF position.

(e1) Check that indications disappear from windows 3 and 4 (7 and 8).

(f) Place FLIGHT-TEST ALL-TEST UNIT in FLIGHT position.

(4) Place the four AUTOTHROTTLE isolation switches in OFF position and the throttle control levers in mid-way position.

D. Check of AP engagement, FD engagement, and AP warning

(1) On ADC control panel, place ADC1 selector switch in TEST 2 position, ADC2 selector switch in TEST 2 position, and when data is stabilized, press ADC1 and ADC2 warning lights.
Re-engage systems which have disengaged (trim and autostabilizer).

(2) On AFCS control unit, engage FD1 switch

(a) The switch must remain engaged

(b) PITCH mode selection push-button must illuminate.

(c) On Captain's ADI, the pitch bar must appear and be centred. FD flag must disapppear and FD1 marker is displayed.

(3) Engage FD2 switch.

(a) The switch must remain engaged.

(b) On First Officer's ADI, the pitch bar must appear and be centred.
FD flag must disappear and FD2 marker is displayed.

(4) Engage AP1 switch

(a) HDG HOLD mode selection push-button must illuminate (PITCH HOLD is already illuminated)

(b) AP1 caption light must illuminate.

(c) Pitch bars must disappear from both ADI's.

(d) Check that there is no significant displacement of control column.

(5) Engage AP2 switch.

(a) The switch must remain engaged.

(b) AP2 caption light must illuminate.

(c) AP1 switch must disengage.

(d) AP1 caption light must extinguish.

(e) Check that there is no significant displacement

of control column.

(6) On Captain's and First Officer's VOR-ILS-DME control units, display an ILS frequency (108.1 MHz for example)

(7) On AFCS control unit, select LAND mode.

(a) The prime indicator lights under LAND, GLIDE and VOR/LOC push-buttons must illuminate.

(8) Engage AP1 switch.

(a) The switch must remain engaged.

(b) AP1 caption light must illuminate.

(c) AP2 switch must remain engaged.

(9) On Captain's control column, press then release AP/ DISC switch.

(a) AP1 and AP2 switches must disengage.

(b) AP1 and AP2 caption lights must extinguish.

(c) HDG HOLD mode selection push-button must extinguish (PITCH HOLD mode selection push-button remains illuminated).

(d) The pitch bars must appear on both ADI's.

(e) On both W & LD indicators, AP red warning lights must illuminate.

(f) The cavalry charge aural warning must sound during 1 second.

(10) Press Captain's W & LD indicator AP red warning light.

(a) Both AP warning lights must extinguish.

(11) Manually disengage FD1 and FD2 switches.

(a) PITCH HOLD mode selection push-buttons must extinguish.

(b) The pitch bars must disappear from both ADI's.

E. Check of AFCS Datum Adjust Unit TURN Knob

(1) On AFCS control unit, engage AP1 switch.

(a) Switch must remain engaged.

(b) PITCH HOLD and HDG HOLD mode selection push-buttons must illuminate.

(c) AP1 caption light must illuminate.

(d) Check that there is no significant displacement of control column.

(2) On AFCS datum adjust unit, rotate TURN knob to the right.

(a) Both control column handwheels must rotate to the right.

(b) Elevons must deflect for a right turn (check on ICOVOL indicator).

(3) Rotate TURN knob to the left.

(a) Both control column handwheels must rotate to the left.

(4) Return TURN knob to neutral position.

(5) Engage AP2 switch.

(a) AP1 switch must disengage.

(6) Repeat check of datum adjust unit TURN knob using AP2 in place of AP1.

(a) Results must be identical.

(7) On First Officer's control column handwheel, press then release AP DISC push-button.

(a) AP2 switch must disengage.

(b) On both W & LD indicators, AP red warning lights must illuminate.

(c) Cavalry charge aural warning must sound for one second.

(8) Press AP DISC push-button.

(a) Both AP warning lights must extinguish.

F. Check of Heading and Track (HDG-TRK) push-pull knobs

(1) On AFCS control unit, pull both HDG-TRK push-pull knobs and, by means of these knobs, display the heading shown on both HSI's (zero degree heading error)

(2) Engage FD1 switch

(a) The switch must remain engaged.

(b) PITCH HOLD mode selection push-button must illuminate.

(c) On Captain's ADI, the pitch bar must appear.

(3) Select HDG/TRK mode.

(a) HDG/TRK mode selection push-button must illuminate

(b) On Captain's ADI, the roll FD bar must be centred.

(4) Slightly rotate HDG TRK 1 push-pull knob clockwise (increasing heading)

(a) On Captain's ADI, the roll FD bar must move to the right.

(b) On Captain's HSI, heading pointer must indicate the heading selected by means of HDG-TRK 1 push-pull knob.

(5) Set the selected heading to the aircraft heading.

(6) Manually disengage FD1 switch and engage FD2 switch.

(7) Select HDG/TRK mode and repeat operations (4) and (5) using HDG-TRK 2 push-pull knob in place of HDG-TRK 1 push-pull knob and read First Officer's HSI and ADI indications.

(a) The results must be identical.

(8) Disengage FD2 switch.

G. Check of azimuth mode selection

(1) On AFCS control unit, engage FD1 switch.

(a) The switch must remain engaged.

(b) PITCH HOLD mode selection push-button must illuminate.

(2) Select VOR/LOC mode

(a) VOR/LOC prime indicator light must illuminate.

(3) Select HDG HOLD mode

(a) VOR/LOC prime indicator light must extinguish.

(b) HDG HOLD mode selection push-button must not illuminate.

(4) Select LAND mode

(a) The three GLIDE, VOR/LOC and LAND prime indicator lights must illuminate.

(5) Select HDG HOLD and PITCH HOLD mode.

(a) GLIDE, VOR/LOC and LAND prime indicator lights must extinguish.

(b) PITCH HOLD mode selection push-button must illuminate.

(6) Select TURB mode.

(a) FD1 switch must disengage.

(b) PITCH HOLD mode selection push-button must extinguish.

(c) TURB mode selection push-button does not illuminate.

H. Close-Up

(1) Carry out the close-up required, for the engagement of both AP's and both FD's (Ref. 22-10-00, Servicing).

(2) Disconnect electrical ground power unit and de-energize the aircraft electrical network (Ref. 24-41-00, Servicing).

AZIMUTH COMPUTER - REMOVAL/INSTALLATION

1. General

WARNING : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

Azimuth AP/FD computers 1C13 and 2C13 are respectively mounted on shelves 4-215 and 4-216 in electronics racks. Locating pins are provided on connectors so that computer replacement with a computer of a different type is made impossible.

Removal procedures for replacement of the two computers being identical ; only one procedure is described.
Only the circuit breakers associated with the computer to be removed are to be tripped.

2. Computer

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.47 m (14 ft.8 in.)	
Circuit Breaker Safety Clips	

B. Prepare

(1) For removal of computer No.1 (1C13), trip, safety and tag the following circuit breakers :

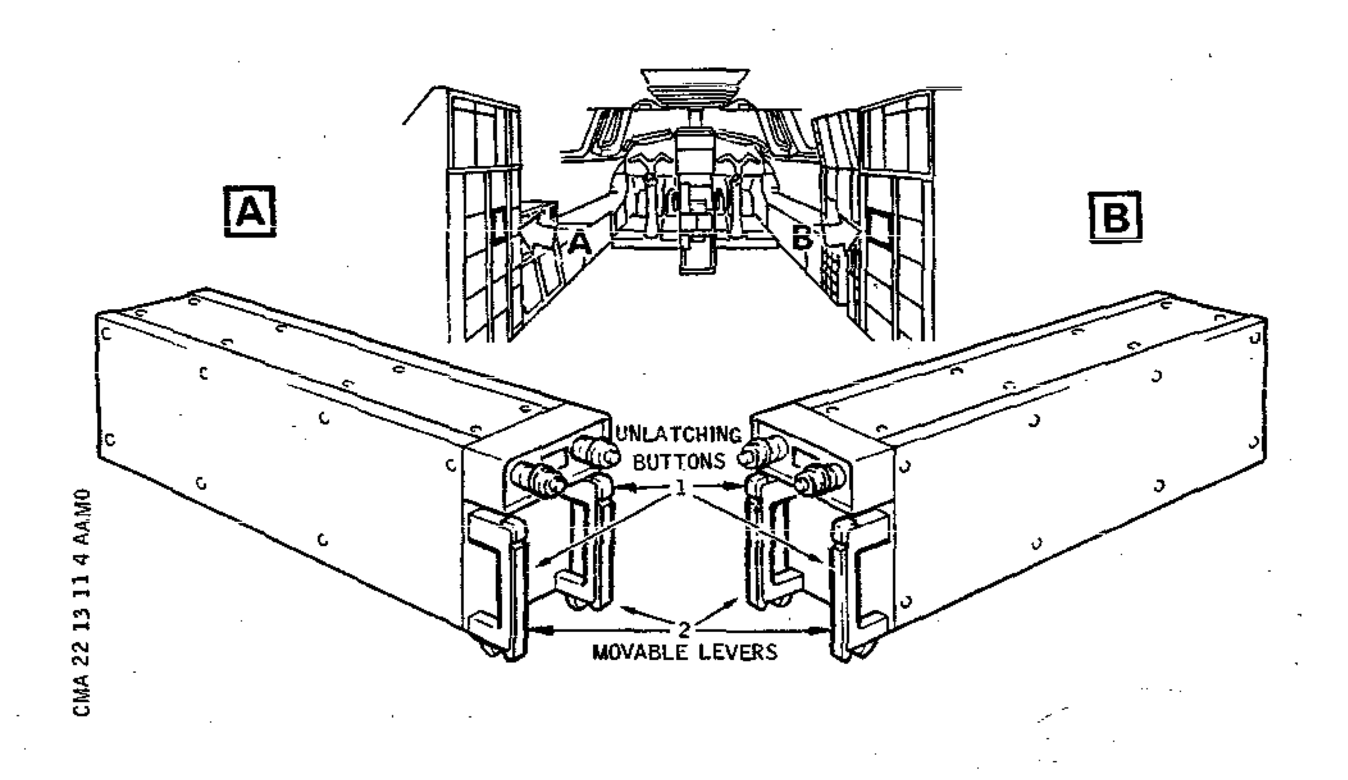
SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AP/FD SYS 1 CONT	1-213	1C 17	Q13
AP/FD SYS 1 SUP	2-213	1C 20	C 5
AP/FD COMP 1 SUP	13-215	1C 18	A 5
AFCS MODE SYS 1 LTS SUP		1C 273	B 5

(2) For removal of computer No.2 (2C13), trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AP/FD SYS 2 CONT	5-213	2C 17	A11
AP/FD SYS 2 SUP	13-216	2C 20	A17
AFCS MODE SYS 2 LTS SUP		2C 273	E17
AP/FD COMP 2 SUP		2C 18	F18

R (3) Remove panel 215BS to gain access to shelf 4-215 for
R removal of computer No.1 (1C 13) or panel 216BS for
R removal of computer No.2 (2C 13).

C. Remove



Location of Azimuth AP/FD Computers
Figure 401

R (1) On front face of the computer, press unlatching buttons
R (1) on top of the two pulling handles.

R (a) The two movable levers (2) fall.

R (2) Fully lower the two movable levers.

R (3) Withdraw computer by pulling the handles.

D. Preparation of Replacement Component

R (1) Make certain that computer seating is clean and that
R rack connectors are in correct condition (no
R corrosion).

R (2) Visually check azimuth computer for correct external
R condition (no dents) and check that connectors are
R undamaged and free from traces of corrosion.

E. Install

(1) Press the two unlatching buttons.

R (a) The two movable levers fall.

(2) Position computer on its rails.

(3) Push computer fully home.

R (4) Lift the two movable levers until the pawls lock into
R position.

(5) Remove safety clips and tags and reset the circuit
R breakers previously tripped.

F. Tests (Ref. Adjustment/Test)

G. Close-Up

R (1) Install panel 215BS or 216BS.

R (2) Remove access platform.

Printed in England

AZIMUTH COMPUTER - ADJUSTEMENT/TEST

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

1. General

CAUTION : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, Servicing).

Test procedure being identical for each computer, only computer No.1 (Captain's side) test is described, while information relating to computer No.2 (First Officer's side) is given in parentheses.
Work preparation is, however, common to both computers.

2. Operational Test

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.47 m (14 ft.8 in.)	

R B. Prepare

R B WARNING : DO NOT ENGAGE AN AUTOPILOT WHEN THE AIRCRAFT
R B IS ON JACKS.

(1) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(2) On Flight Engineer's panel, on EQUIPMENT BAY COOLING panel, make certain that electronics rack ventilation is operating (Ref. 21-21-00).

(3) Set flight control system in Blue or Green electrical mode (Ref. 27-00-00, Servicing).

(4) Carry out work preparation required for engagement of both APs (Ref. 22-10-00, Servicing)

(5) On AFCS control unit, pull both HDG-TRK knobs and select heading displayed on associated HSI.

C. Tests

(1) On AFCS control unit, engage AP1 (AP2) switch.

(a) Switch remains engaged.

(b) On AFCS control unit

(b1) AP1 (AP2) indicator light must illuminate.

(b2) PITCH HOLD and HDG HOLD push-buttons must illuminate.

(c) Check that control column displacement is not significant.

(2) As soon as control column stops, press HDG TRK knob on AFCS control unit.

(a) This knob illuminates

(b) HDG HOLD push-button extinguishes.

(3) On AFCS control unit, slightly rotate HDG TRK 1 (HDG TRK 2) knob clockwise.

(a) Control column handwheel rotates to the right.

(b) Elevons deflect as for a right turn (check on the ICOVOL indicator).

(4) Slightly rotate HDG TRK 1 (HDG TRK 2) knob counter-clockwise.

(a) Control column handwheel rotates to the left.

(b) Elevons deflect as for a left turn.

(5) Return HDG TRK 1 (HDG TRK 2) knob to its previous position.

(6) On datum adjust unit, rotate TURN knob clockwise.

(a) HDG TRK knob extinguishes.

(b) HDG HOLD push-button illuminates.

(c) Control column handwheel rotates to right.

(d) Elevons deflect as for a right turn.

(7) Rotate TURN knob counter-clockwise.

(a) Control column handwheel rotates to left.

(b) Elevons deflect as for a left turn.

(8) Return TURN knob to centre position.

(9) On Captain's control column handwheel, press then release AP DISC push-button.

(a) AP1 (AP2) engage switch disengages.

(b) HDG HOLD and PITCH HOLD push-buttons extinguish.

(c) AP1 (AP2) indicator light extinguishes.

(d) AP warnings are displayed on both warning and landing display indicators.

(e) Cavalry charge aural warning sounds for one second.

(10) On First Officer's control column, press then release AP DISC push-button.

(a) AP warning is cancelled.

D. Close-Up

(1) Carry out close-up required for engagement of both APs (Ref. 22-10-00, Servicing).

(2) De-energize the aircraft electrical network, and dis-

connect electrical ground power unit (Ref. 24-41-00, Servicing).

RELAY JACK SENSOR - REMOVAL/INSTALLATION

1. General

WARNING : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

The removal procedure is identical for roll and yaw relay jack sensors C4 and C5. Thus only one removal operation is described.

R These two independent relay jack sensors are installed on the
R relay jack chassis and each input lever is driven by the corresponding relay jack.

2. Relay Jack Sensor

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.470 m (14 ft 8 in.)	
Access Platform 2.960 m (9 ft. 3 in.)	
Warning Notices	
Circuit Breaker Safety Clips	
Socket Blanking Caps	
Stainless Steel Cotter Pin	
R Lockwire - Dia. 0.8 mm (0.032 in.) Corrosion Resistant Steel	

B. Prepare

WARNING : DISPLAY WARNING NOTICES ON ENGINES 1, 2 AND 3 PROHIBITING PRESSURIZATION OF BLUE, GREEN AND YELLOW HYDRAULIC SYSTEMS BY HYDRAULIC GROUND POWER UNIT.

DISPLAY A WARNING NOTICE AT FLIGHT ENGINEER'S STATION PROHIBITING USE OF GROUND PRESSURIZING SYSTEM ELECTRIC PUMPS.

WARNING : DISPLAY A WARNING NOTICE IN FLIGHT COMPARTMENT PROHIBITING OPERATION OF FLIGHT CONTROLS.

(1) Trip, safety and tag the following circuit breakers :

(a) Roll axis

SERVICE	PANEL	CIRCUIT BREAKER		MAP REF.
LAT ACCELMTR 1 26 V SUP	2-213	1C	42	A 4
LAT ACCELMTR 2 26 V SUP	13-216	2C	42	B16

(b) Yaw axis

SERVICE	PANEL	CIRCUIT BREAKER		MAP REF.
AP/FD SYS 1 SUP	2-213	1C	20	C 5
AP/FD SYS 2 SUP	13-216	2C	20	A17

C. Remove

R (1) At Flight Engineer's station, remove floor panels 213EF and 213DF for access to roll axis relay jack sensor C4,
R or floor panel 213DF only for access to yaw axis relay jack sensor C5.

R (2) Disconnect the two electrical plug connectors from receptacles A and B ; identify them.

R (3) Install blanking caps on receptacles A and B.

(4) Open access door 121FB, and disconnect relay jack
R link rod (7) from input lever (9) of relay jack sensor (10) to be removed.

(5) Proceed as follows :

(a) Remove cotter pin (3).

(b) Remove nut (4).

(c) Remove and retain washer (5) and special washer (6).

(d) Remove pip pin (8).

(6) Cut and remove lockwire from the two attachment screws (2).

(7) Remove the two attachment screws while holding the relay jack sensor.

(8) Remove relay jack sensor (10).

D. Preparation of Replacement Component

R (1) Remove relay jack sensor input lever handling equipment and install it on the removed relay jack sensor.

R (2) Visually check relay jack sensor for evidence of corrosion and dents ; in particular check that input lever and electrical connectors are not damaged.

E. Install

(1) Install relay jack sensor (10).

(2) Tighten the two attachment screws (2).

(3) Through access door 121FB position and connect link rod (7) to input lever (9) of relay jack sensor.

(4) Proceed as follows.

R (a) Push pip pin (8) fully home.

(b) Install special washer (6).

(c) Install washer (5).

(d) Tighten nut (4).
Torque to between 12 and 15 lbf.in. (0.135 and 0.170 m.daN).

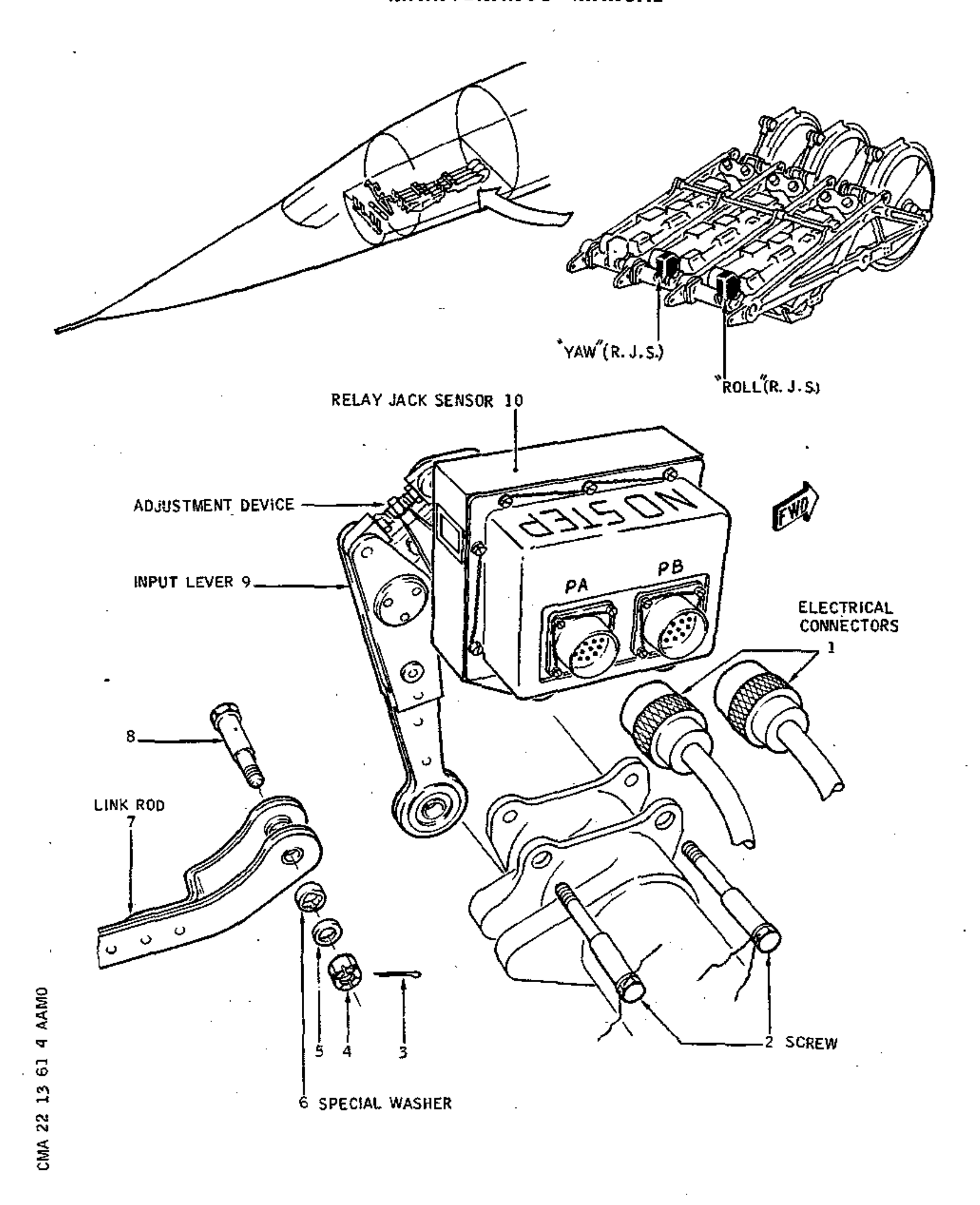
(e) Safety with cotter pin.

(5) Wirelock the two attachment screws (2).

R (6) Remove blanking caps from receptacles A and B.

R (7) Connect the two electrical plug connectors (1) to receptacles A and B.

R (8) Remove safety clips and tags and reset the circuit breakers corresponding to the relay jack sensor installed.



R Relay Jack Sensor Installation
Figure 401

(9) Remove warning notices.

F. Test

R (Ref. 22-13-61, Adjustment/Test)

G. Close-Up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2) Install and secure floor panel 213EF and/or 213DF and close access door 121FB.

(3) Remove access platforms.

Printed in England

RELAY JACK SENSOR - ADJUSTMENT/TEST

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

1. General

WARNING : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

The purpose of the following test procedure is to check that there is no discrepancy between the roll or the yaw relay jack position and the monitored position of the associated relay jack sensor (RJS) resolvers. These resolvers issue AC position feedback signals to AP/FD azimuth computers 1 and 2 and the autostabilization computers, the latter being associated with the roll relay jack sensor only.

This procedure is carried out with the aircraft on the ground and can be performed in two ways.

A. Check by measuring voltage on front face of AP/FD azimuth computers.

B. Check by measuring angle on roll and on yaw RJS by means of a test set.

2. Check by Measuring Voltage on Front Face of AP/FD Azimuth Computers

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.440 m (14 ft 8 in)	-
Access Platform 2.960 m (9 ft 8 in)	-
Electrical Ground Power Unit	-
RB Rigging Pin-Synchro Pack - Roll	D925252003
Rigging Pin-Synchro Pack - Yaw	D925252002
Multimeter	-

B. Prepare

(1) Make certain that the following circuit breakers are set:

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AP/FD SYS 1 CONT	1-213	1C 17	Q13
FLT CONT POSN IND CONT		C 83	R11
LAT ACCELMTR 1 26V SUP	2-213	1C 42	A 4
FLT CONT POSN IND 26V 400HZ SUP		C 84	B 4
AP/FD SYS 1 SUP		1C 20	C 5
AP/FD SYS 2 CONT	5-213	2C 17	A11
AP/FD COMP 1 SUP	13-215	1C 18	A 5
AP/FD SYS 2 SUP	13-216	2C 20	A17
LAT ACCELMTR 2 26V SUP		2C 42	B16
AP/FD COMP 2 SUP		2C 18	F18

(2) Reset the following circuit breakers:

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-216	X 345	G 4

(3) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(4) At Flight Engineer's station, on EQUIPMENT BAY COOLING panel, make certain that electronics rack ventilation is operating (Ref. 21-21-00).

(5) Pressurize Blue hydraulic system (Ref. 29-12-00, Servicing) and Green hydraulic system (Ref. 29-11-00, Servicing).

(6) Set flight controls and pitch, roll, and yaw trim control wheels to neutral position.

(7) On ceiling panel, on flight control unit, place the two BLUE INVERTER and GREEN INVERTER switches in OFF INV position.

(8) On ICOVOL (flight control surface position indicator), make certain that elevons and rudders are in zero degree position.

(9) Open access door 121FB.

(10) Insert rigging pin in synchro chassis lever corresponding to RJS to be tested.

(11) At Flight Engineer's station, remove floor panels 213EF and 213DF providing access to roll RJS (C4) or floor panel 213DF providing access to yaw RJS (C5).

C. Test

(1) Roll relay jack sensor.

(a) On shelf 4-215, at least three minutes after energizing AP/FD computers, remove blanking cap from test connector ZA on front face of azimuth computer 1C13.

(b) Connect multimeter negative lead to terminal 54

and positive lead to terminal 74 of computer test connector ZA.

B (c) The DC voltage measured between these two terminals must be lower than 200mv.

If necessary, adjust as described in paragraph 3C (2) to obtain a voltage lower than 200mv.

(d) Disconnect multimeter and install blanking cap on computer test connector ZA.

(e) Remove rigging pin from roll synchro chassis.

(f) Engage AP1 and check datum adjust unit TURN knob operation (deflection of elevons) (Ref. 22-10-00, Adjustment/Test, Operational Test, paragraph 2G). Then engage AP2 and repeat check.

(2) Yaw relay jack sensor.

(a) On shelf 4-215, at least three minutes after energizing AP/FD computers, remove blanking cap from test connector ZA on front face of azimuth computer 1C13.

(b) Connect multimeter negative lead to terminal 54 of computer test connector ZA.

(c) Connect multimeter positive lead to terminal 75 of computer test connector ZA.

B (d) Measure and read the DC voltage and sign.

(e) Connect multimeter positive lead to terminal 14 of computer test connector ZA.

(f) Measure and read voltage and sign.

(g) Sum algebraic values of voltages measured in (d) and (f).
Sign value shall be taken into account. Sum values as follows.

(g1) Voltage measured in (d) + voltage measured in (f) = algebraic sum of voltages.

(g2) This algebraic sum must be lower than 190mv.

If voltage is greater than 190mv, adjust as described in paragraph 3C (2) in order to obtain a voltage lower than 190mv.

(h) Disconnect multimeter and install blanking cap on computer test connector ZA.

(i) Remove rigging pin from yaw synchro chassis.

(j) Engage AP1 and check datum adjust unit TURN knob operation (deflection of rudder). (Ref. 22-10-00, Adjustment/Test, Operational Test paragraph 2G). Then engage AP2 and repeat check.

(k) On flight control unit, place the two BLUE INVERTER AND GREEN INVERTER switches in PWR OFF position.

D. Close-Up.

(1) Trip, safety, and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14 XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-216	X 345	G 4

(2) Depressurize Blue hydraulic system (Ref. 29-12-00, Servicing), and Green hydraulic System (Ref. 29-11-00, Servicing).

(3) Install and secure floor panel 213DF and/or floor panel 213EF

(4) Close access door 121FB.

(5) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(6) Remove access platform

3. Check by Means of Test Set

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.440 m (14 ft 8 in)	-
Access Platform 2.960 m (9 ft 8 in)	-
Electrical Ground Power Unit	-
Test Set-Zero Settings - Resolvers	TE3016
RB Rigging Pin-Synchro Pack - Roll	D925252003
Rigging Pin-Synchro Pack - Yaw	D925252002
Circuit Breaker Safety Clips	-
Lockwire - Dia. 0.8 mm (0.032 in) Corrosion Resistant Steel	- -

B. Prepare

(1) Trip, safety and tag the following circuit breakers.

(a) Roll axis.

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
LAT ACCELMTR 1 26V SUP	2-213	1C 42	A 4
LAT ACCELMTR 2 26V SUP	13-216	2C 42	B16

(b) Yaw axis.

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AP/FD SYS 1 SUP	2-213	1C 20	C 5
AP/FD SYS 2 SUP	13-216	2C 20	A17

(2) Connect electrical ground power unit, and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(3) At Flight Engineer's station, on EQUIPMENT BAY COOLING panel, make certain that electronics rack ventilation is operative (Ref. 21-21-00).

(4) Pressurize Blue hydraulic system (Ref. 29-12-00, Servicing) and Green hydraulic system (Ref. 29-11-00, Servicing).

(5) Place flight controls in neutral position.

(6) Open access door 121 FB

(7) Insert rigging pin in synchro chassis lever corresponding to RJS to be tested.

(8) At Flight Engineer's station, remove floor panels 213EF and 213DF providing access to roll RJS C4 or floor panel 213DF providing access to yaw RJS C5.

C. Check and Adjust

(1) Check of electrical zero

(a) On test set panel, make certain that ON-OFF switch is in OFF position.

(b) Check that the three POWER JACKS, FEEL CHASSIS, and AFCS SENSORS switches are in 0 position.

(c) Place SCALE selector switch in 3° position.

(d) Connect 28 VDC supply cable to the aircraft electrical network.

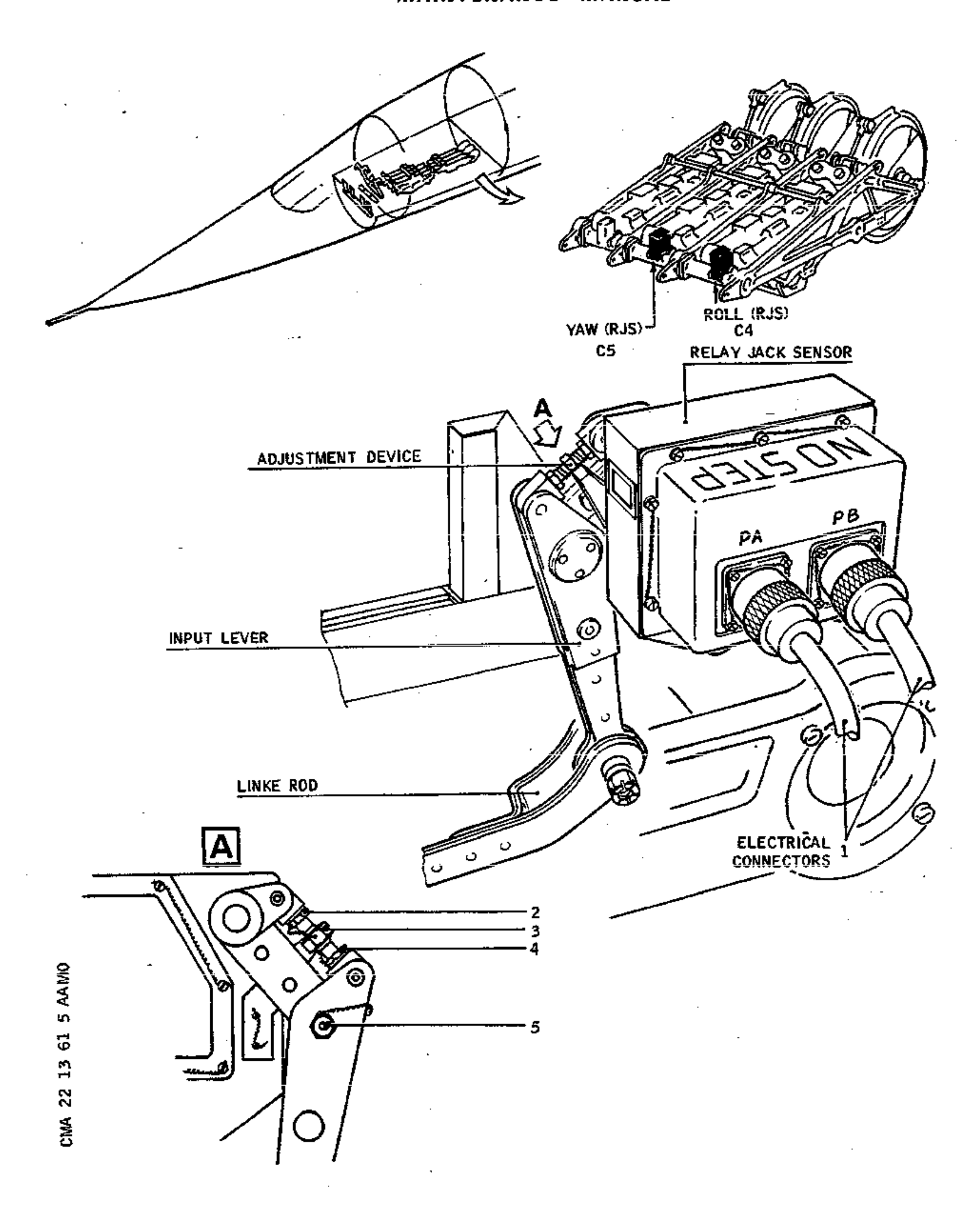
(e) Disconnect the two electrical plug connectors (1) from the two receptacles A and B on RJS being tested.

(f) By means of cable 3016-205, connect AFCS RELAY JACK connector to the two receptacles A and B.

(g) Place ON-OFF switch in on position.

(g1) The associated light must illuminate.

(h) Successively place AFCS SENSORS switch in the four RELAY JACK SENSOR positions : 2, 3, 4, 5.



Relay Jack Sensor Adjustment Device
Figure 501

(i) The maximum output angle value displayed on the test set indicator must be, for each position : ± 0.4 degrees.

NOTE : If this value exceeds 0.4 degrees, carry out RJS adjustment as indicated in paragraph below.

(2) Adjustment of electrical zero.

(a) Cut and remove lockwire from nuts (2,4 and 5).

(b) Loosen relay jack sensor input lever nut (5).

(c) Loosen the two adjustment device nuts (2 and 4)

NOTE : These two nuts have a different type of thread : nut (2) has a LH threading, nut 4 a RH threading.

(d) By means of the adjusting nut (3), adjust to a maximum output angle value of ± 0.4 degrees for the four above mentioned AFCS SENSORS switch positions

(e) Fully tighten nut (5) on input lever. Torque to between 30 lbf. in. and 35 lbf. in. (0.33 m. daN and 0.39 m.daN)

(f) Fully tighten the two nuts (2 and 4).

(g) Wirelock nuts (2, 4 and 5)

D. Close-Up

(1) On test set panel.

(a) Place ON-OFF switch in OFF position.

(b) Disconnect cable 3016-205 .

(c) Disconnect 28 VDC supply cable.

(d) Remove cables.

(e) Place AFCS SENSOR switch in 0 position.

(f) Place SCALE selector switch in 0 position.

(2) Connect the two electrical plug connectors to the associated RJS receptacles, A and B.

(3) Remove safety clips and tags and reset the circuit breakers associated with the RJS being tested. (Ref. paragraph 3 B (1) (a) or (b)).

(4) Remove rigging pin from synchro chassis lever corresponding to RJS tested.

(5) Engage AP 1 and check datum adjust unit TURN knob operation (deflection of rudders and elevons) (Ref. 22-10-00, Adjustment/Test, Operational Test, paragraph 2 G).
Then engage AP2 and repeat check.

(6) Depressurize Blue hydraulic system (Ref. 29-12-00, Servicing) and Green hydraulic system (Ref. 29-11-00, Servicing).

(7) Install and attach floor panel 213 EF and/or 213 DF.

(8) Close access door 121 FB.

(9) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(10) Remove access platforms.

SPEED/ATTITUDE CORRECTION - DESCRIPTION AND OPERATION

1. General

The aircraft is equipped about its three axes with an autostabilization system and about the pitch axis only with one electric trim system.

R The autostabilization system enables the aircraft control to be damped against the various disturbances in order to improve aircraft flight qualities within the whole flight envelope.

The electric trim system is used in all flight configurations, to suppress the force applied to the control column by the artificial feel system.

The configuration on one axis of these two systems is identical i.e. each axis consists of two separate channels, each being monitored.

R 2. Autostabilization System (Ref. Fig.001 and 002)

R A. Description

(1) The 3 axis autostabilization system consists of :

(a) Two self-monitored computers each comprising computation circuits for one channel and for the three aircraft axes ; each computer also includes the eight PFCU amplifiers.

R (b) Two AS control units each comprising three PITCH, ROLL and YAW engage switches.

(c) Eight rate-gyros provide a signal corresponding to the aircraft angular speed sensed along the three axes in order to make it possible to calculate autostabilization signals.

The distribution of these rate-gyros about the axes is as follows :

- Four rate-gyros for the pitch axis (one controlling rate-gyro and one monitoring rate-gyro for each channel).

Two rate-gyros for the roll axis (one rate-gyro for each channel).

Two rate-gyros for the yaw axis (one rate-gyro for each channel).

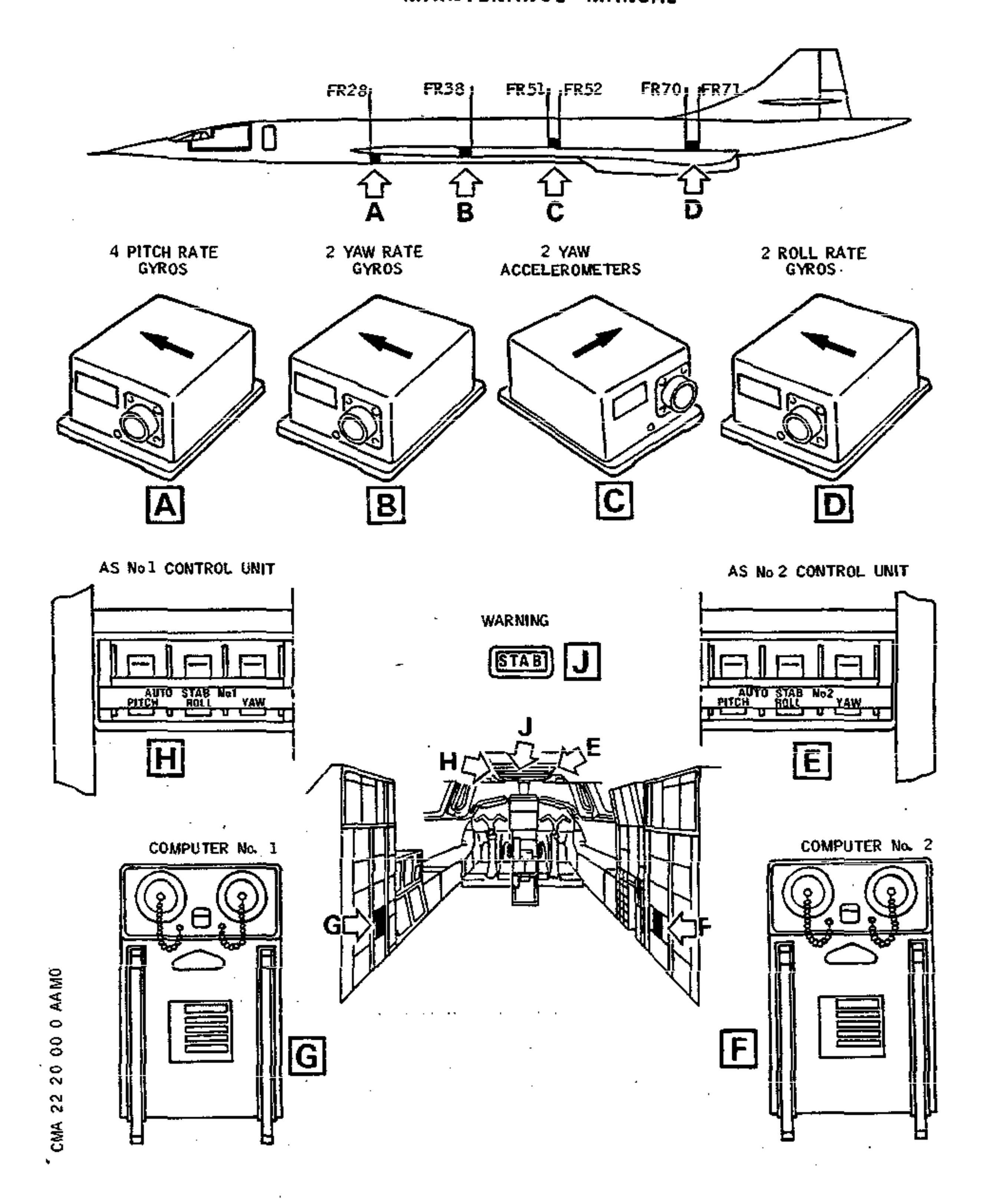
(d) Two lateral accelerometers provide a lateral acceleration term for the following functions :

R - Reduction of yawing resulting from failure of
R one or two engines.
R - High angle of attack manoeuvre.

R (e) The roll axis relay jack sensor (in common with the autopilot) provides a yaw controlled position
R term for the elevons in order to coordinate yaw piloting (coordination on turning) in all the flight envelope. This term is added to the autostabilization orders (angular speed plus lateral acceleration) on the yaw axis.

R (2) Operation principle

R After detection of the aircraft rotation speed about
R the axis in consideration, filtering of structure vi-



Autostabilization System Components
Figure 001

R

R brations, gain change and authority limitation dis-
R pending on Mach number, the autostabilization orders are transferred to the PFCU's through relay assemblies called "open lines" and flight control amplifiers. In addition, the flight controls receive piloting orders. In case of switching of the flight controls to the mechanical mode, autostabilization orders are not taken into account because the servo-valves in the PFCU's are isolated. In other words, the autostabilization system is activated only when the flight controls are in Blue or Green electrical mode.

As to the pitch axis, it transmits the super-stabili-
R zation and the emergency piloting orders which are
R functions generated and provided by the Safety Flight
R Control (SFC) system.

In case of total loss of the autostabilization on one axis, the system sends to the master warning system failure indications involving illumination of the red STAB indicator light on the master warning indicator, accompanied by the gong aural warning.
If pitch axes are concerned when ANTI STALL No.1 and 2 superstabilizers are engaged, SYST 1 FAIL and SYST 2 FAIL indicator lights will illuminate in amber in the flight controls unit located on the ceiling panel if speed is less than 270 Kts. The loss of only one channel about an axis is merely materialized by the engage lever falling down. If pitch axis is concerned, the associated SYST FAIL indicator light will illuminate in amber if Ve is less than 270 Kts.

R 3. Electric Trim System

R A. Description

(1) The electric trim system consists of :

(a) Two self-monitored computers (one per channel).

(b) One trim actuator drives the integrated trim (pitch) and the pitch trim handwheel which provides a "rasping" aural warning to indicate trim rotation.

R (c) One electric trim control unit comprising two engage switches enabling the electric trim activation to be achieved.

(d) Two PITCH TRIM switches providing manual control of the trim in the nose-down or nose-up direction.

(e) One pitch feel sensor which measures the displacement of the artificial feel spring, enables the trim to be controlled automatically.

R (2) Principle of operation

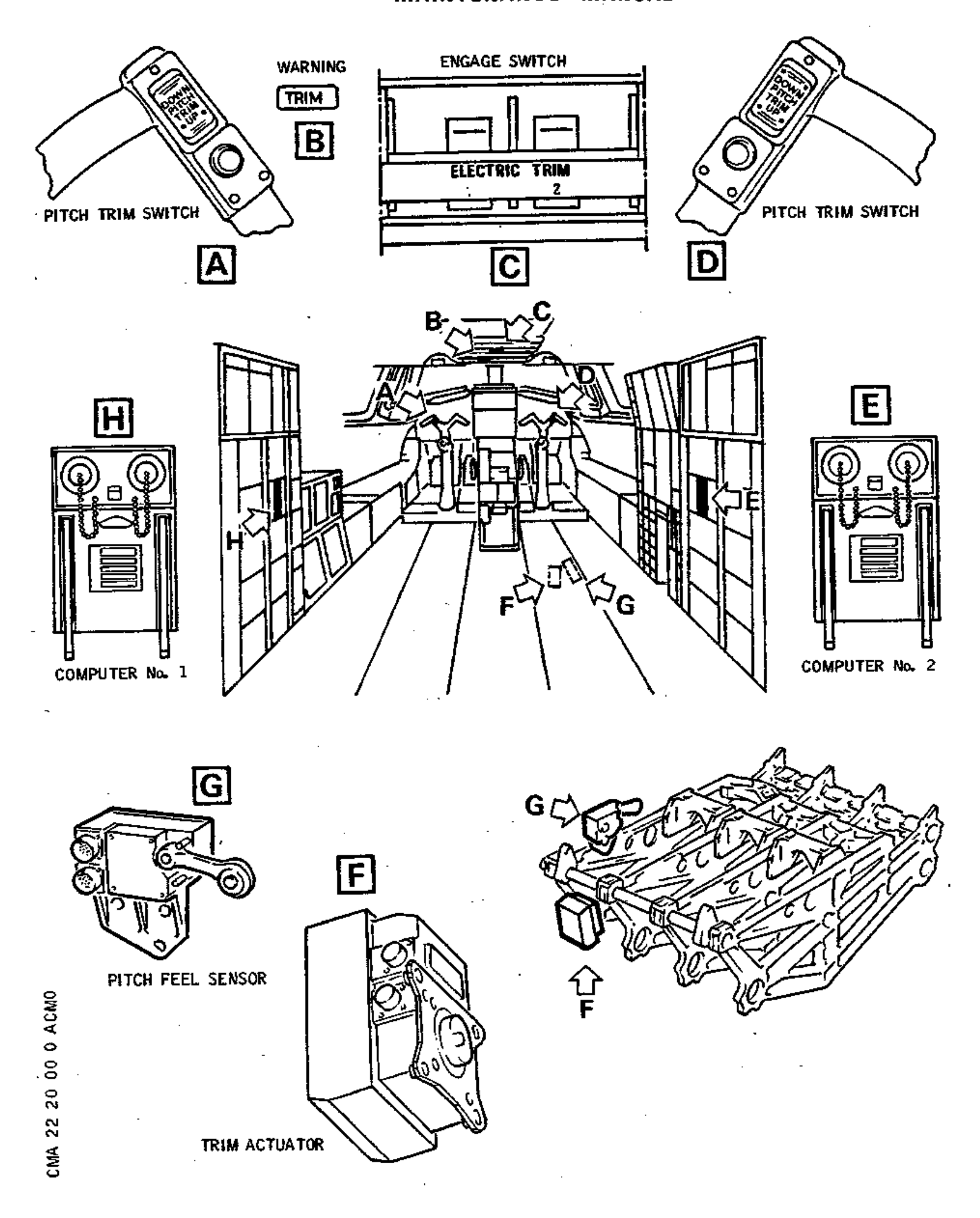
R Each computer controls the position of the actuator
R output shaft as well as its engagement and disengagement.

The trim actuator control signal is generated by the comparison mode between the actuator position signal and the position demand signal. The latter being generated by the Air Data Computer system, the pitch feel sensor or an order given by the pilot.

Data issued by the ADC's are used for the following functions : stabilization, MACH TRIM, INCIDENCE TRIM, IAS (Indicated Air Speed), IAS-VMO (Indicated Air Speed - Velocity, Maximum Operational).

If either trim system (TRIM 1 or TRIM 2 computer) is not engaged (engage switch in OFF position), the system is in SYNCHRONIZATION mode. This mode is available as soon as the aircraft electrical system is energized. Computers are always synchronized with
R trim actuator output shaft position.

In manual piloting, PILOT TRIM mode, the actuator control is ensured by the Captain or First Officer depression of the PITCH TRIM switch ; the control



Components of the Electric Trim System
Figure 002

R

R signal is transmitted via the computer associated
with the trim system engaged (engage switch in ON
R position). The rotation amplitude is proportional to
R the duration of action on the PITCH TRIM switches. This
mode is available when the AP is not engaged.

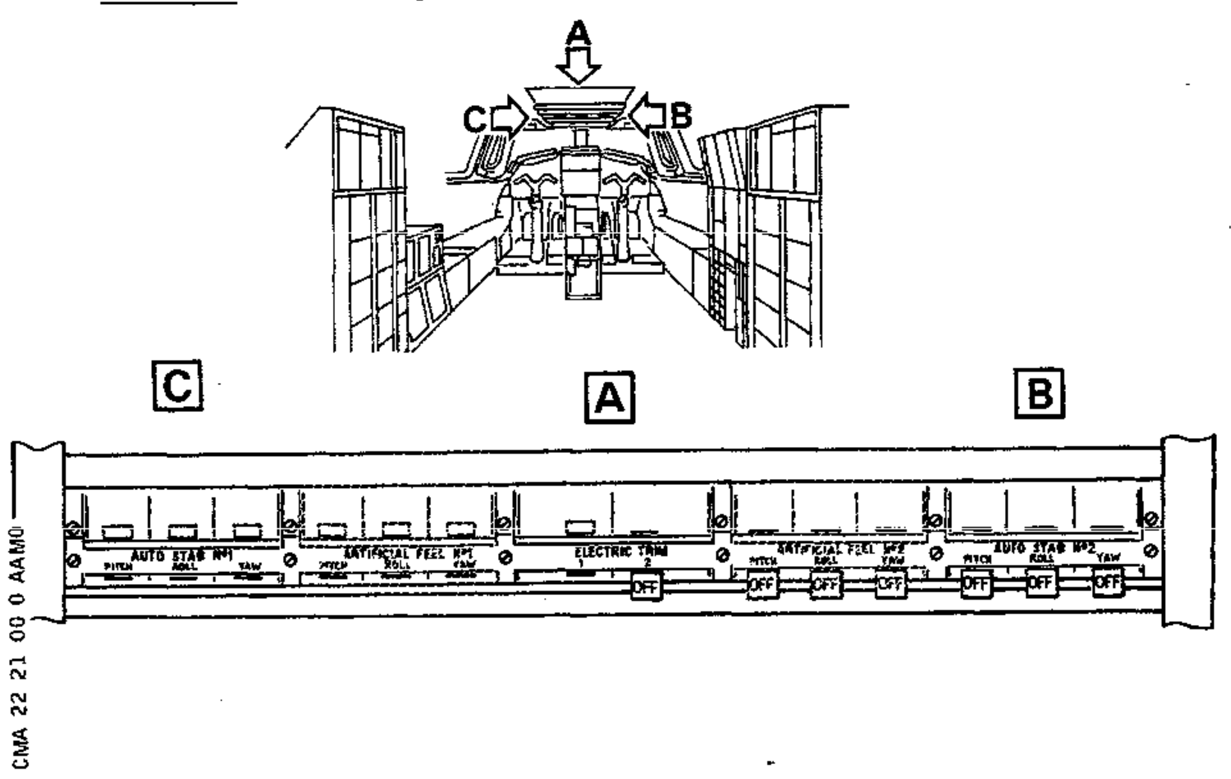
In automatic piloting, AUTO TRIM mode : at least one computer of the autopilot is "engaged". The actuator control order is generated by the computer associated with the trim system according to the data issued by the pitch feel sensor ; this is designed to obtain, in case of autopilot disengagement, a load factor (caused by control column return to null force position) lower than a given value.

In case of total loss of both channels, the TRIM system sends to the master warning unit failure indications involving illumination of the red TRIM indicator light accompanied by the gong aural warning. Loss of one channel is indicated only by the relevant engage switch disengagement (down position).

END OF THIS SECTION

NEXT

1. General (Ref. Fig. 001)



Autostabilizer and Electric Trim Control Units
Figure 001

R The two autostabilizer control units (one per lane) are fitted in the ceiling panel at both ends of the engage switch panel.

The electric trim system control unit is fitted in the ceiling panel. This unit is located in the centre of the engage switch panel.

2. Control Unit - Autostabilizer
(Ref. Fig. 002, 003 and 004)

A. Description

Each autostabilizer control unit comprises 3 engage switches : PITCH, ROLL and YAW (one per axis). These three engage switches are self-held by means of a solenoid. They are supplied with + 15VDC and - 15VDC voltages generated in the computers from a 115 VAC/400Hz supply. It should be noted that any engage switch jamming can be overriden by the pilot

B. Operation

When an engage switch is placed in the ON position, an engage signal selects the appropriate axis in the associated lane, if logic engage conditions are fulfilled.

The system logic enables the two (control and monitoring) holding coils to be supplied, holding the engage switch in the ON position (engaged). Supply cut-out of one coil causes the engage switch to return to the OFF position and the STAB red warning light to illuminate on master warning panel in the case of total loss of autostabilization on one axis.

A specific engage logic, described below, is associated with each autostabilization axis.

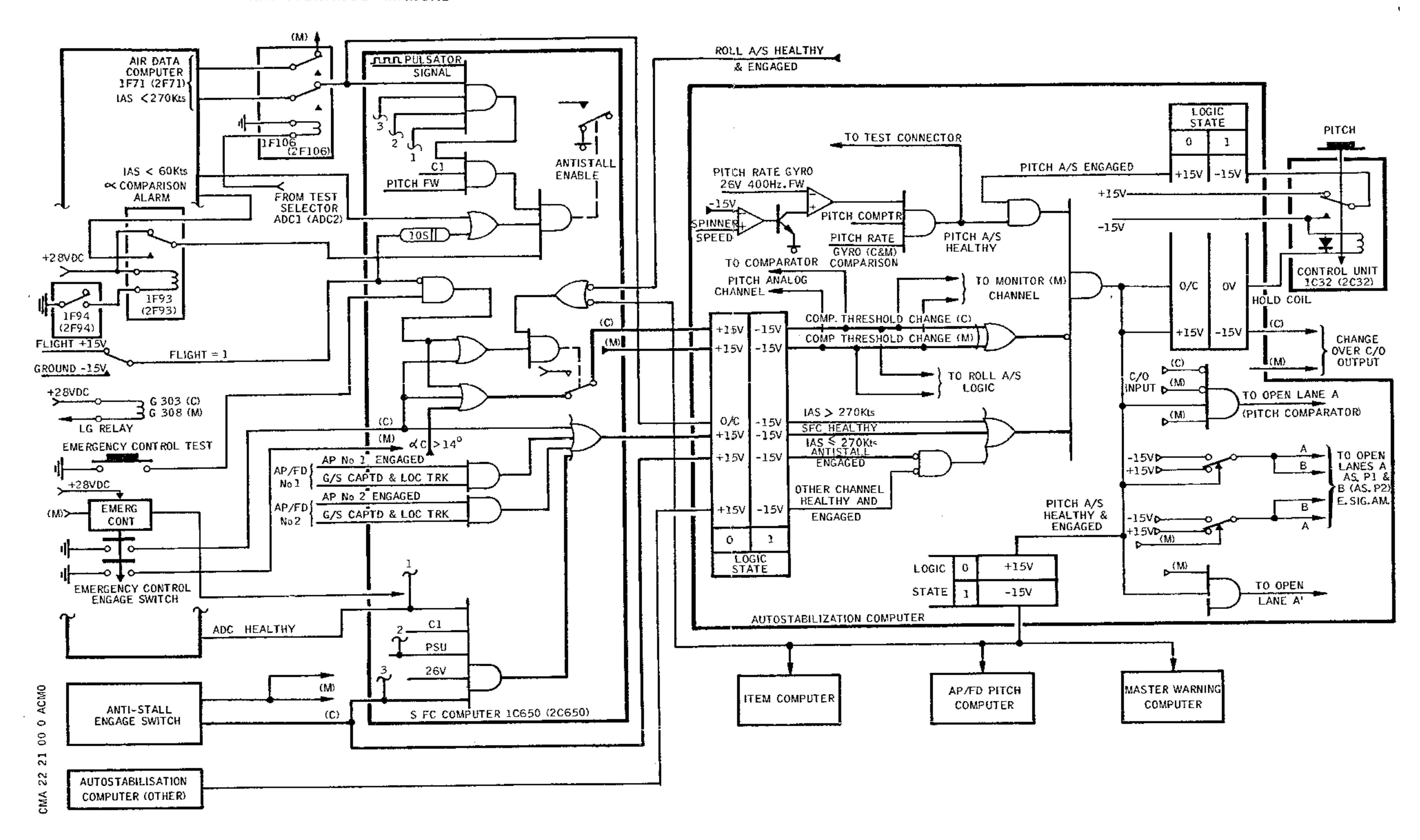
(1) Pitch axis autostabilization

Each axis is considered to be healthy when the following conditions are fulfilled :

- 26VAC/400Hz voltage is normally applied to the rate-gyros
- spinner rotation speed is correct
- analog computation channel comparators indicate a healthy condition
- the comparators of both control and monitoring rate-gyros for the two pitch channels indicate a healthy condition which corresponds to identical signals from both rate-gyros

In addition to the above mentioned conditions and the ± 15 VDC supply the axis healthy and engaged logic condition requires the following data :

- active or inactive comparator threshold change (control and monitoring) signal coming from SFC computers.
- healthy SFC signal from SFC computers which becomes active only when (ANTI STALL) superstabilization function is engaged, with an indicated airspeed



Engage Logic - Pitch Autostabilization
Figure 002

R

less than or equal to 270 Knots, the AP system being neither in LOC TRACK, nor in GLIDE captured mode.
- no failure of associated roll axis autostabilization if emergency flight control is engaged, whatever the indicated airspeed conditions.

Fulfilment of these logic requirements conditions open lanes A and A' and open lanes A and B (Ref. 22-22-00, Description and Operation).
Engagement of pitch axis autostabilization in (ANTI STALL) superstabilization function depends on the following :
- No superstabilization system engaged : ANTI STALL SYSTEM switches 1 and 2 in OFF position.
  Either pitch axis autostabilizer (one only) engaged.
- One superstabilization system engaged : ANTI STALL SYSTEM switch 1 or 2 in ON position.
  Only associated pitch axis autostabilizer engaged.
- Both ANTI STALL SYSTEM switches 1 and 2 in ON position.
  Both pitch axis autostabilizers engaged.

(2) Roll axis autostabilization

Each axis is considered to be healthy if the following conditions are fulfilled :

- 26VAC/400Hz voltage is normally applied to the rate-gyros,
- spinner rotation speed correct,
- analog computation channel comparators indicate a correct condition

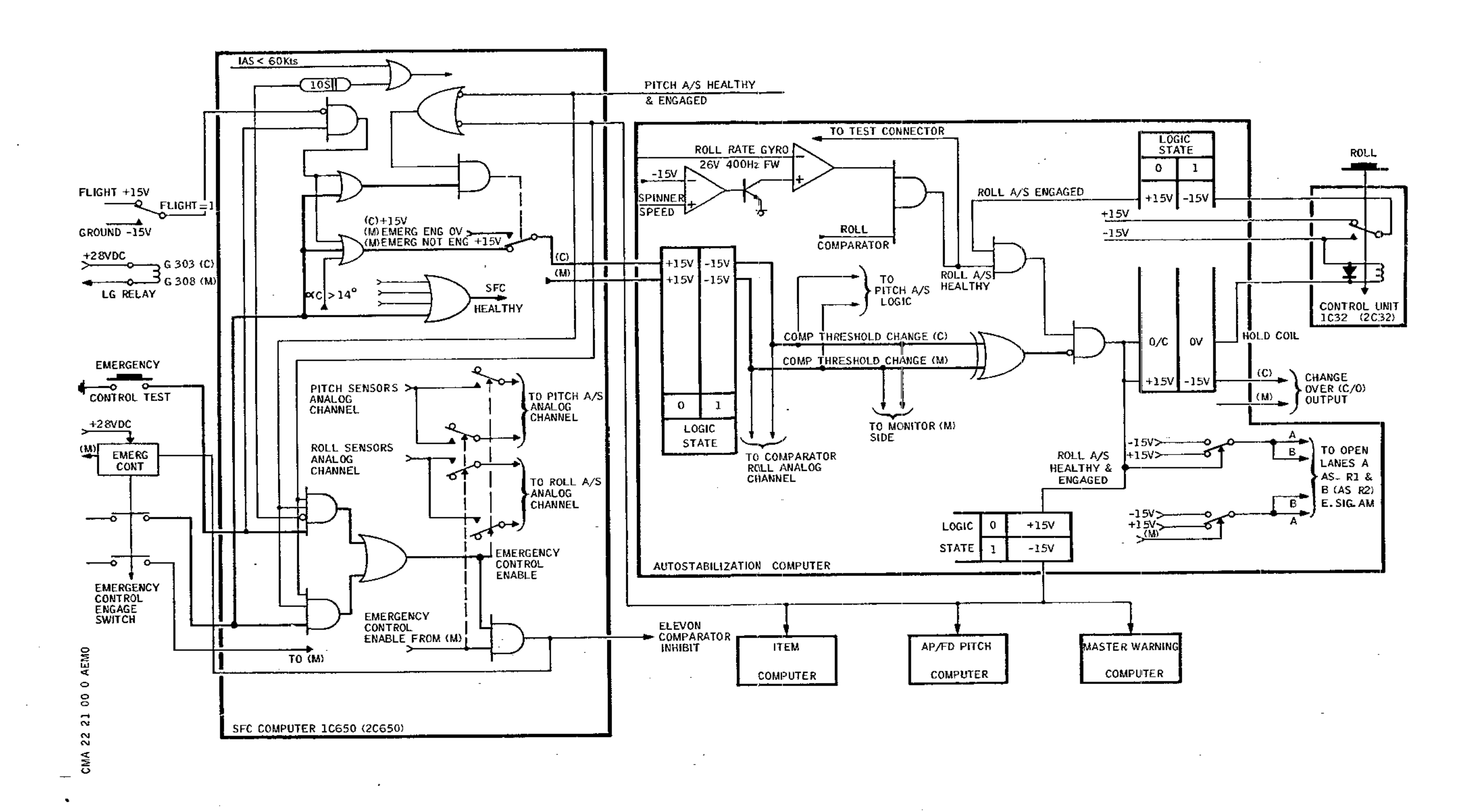
In addition to the above mentioned conditions and the ± 15 VDC coil supply, the axis healthy and engaged logic condition requires the following data :
- active or inactive comparator threshold change (control and monitoring) signal coming from SFC computers.
  (This signal becomes active only when the emergency flight control function is engaged or when the angle-of-attack is greater than or equal to 14 degrees).
- no failure of associated pitch axis autostabilization if emergency flight control is engaged.

Fulfilment of these logic requirements conditions open lanes A and B (Ref. 22-22-00, Description and Operation).

(3) Yaw axis autostabilization

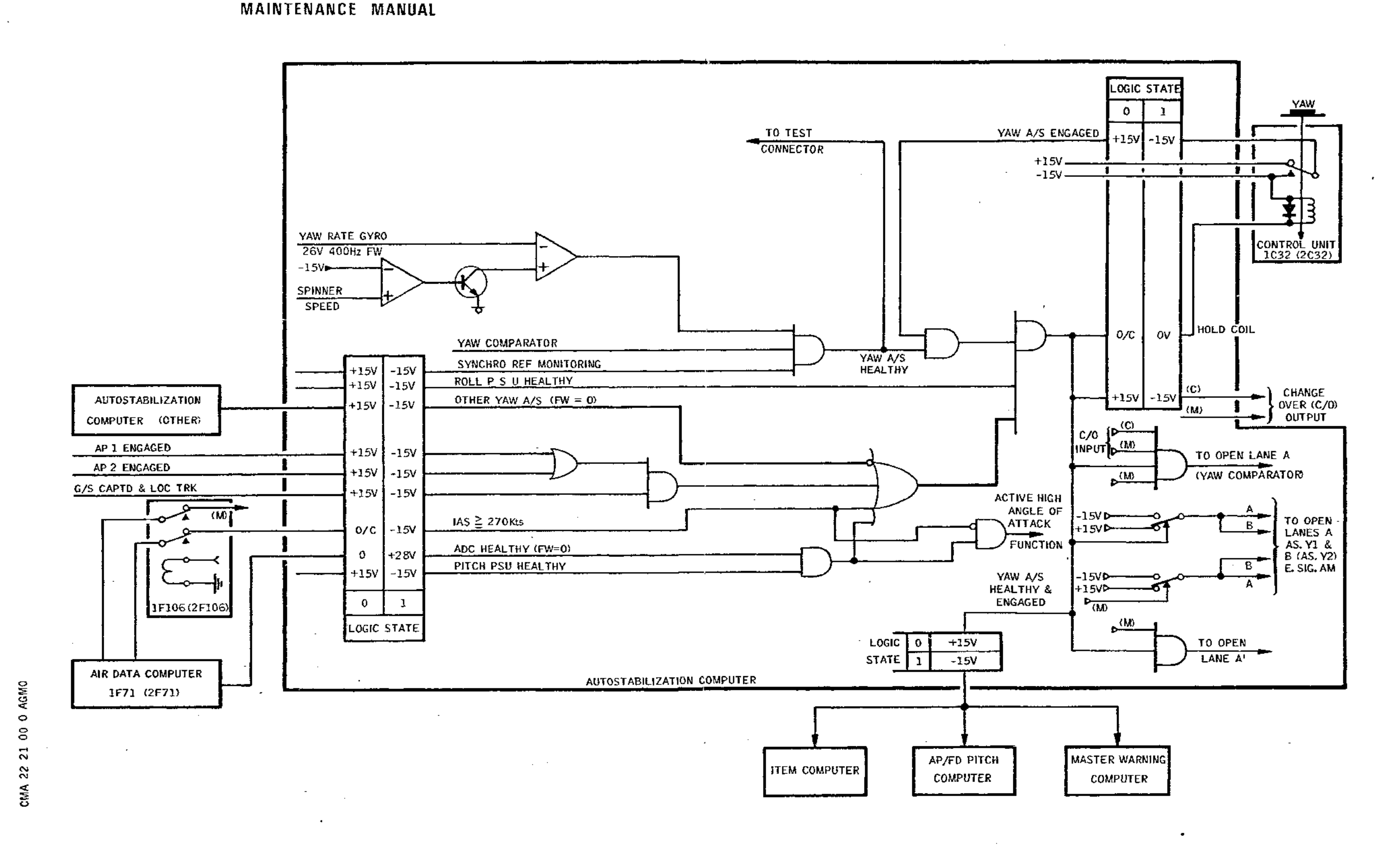
Each axis is considered as healthy if the following

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Engage Logic - Roll Autostabilization
Figure 003

R



R

Engage Logic - Yaw Autostabilization
Figure 004

conditions are present :

- 26VAC/400Hz voltage is normally applied to the rate-gyros.
- spinner rotation speed correct.
- 26VAC/400Hz voltage generated by the aircraft electrical network is normally applied to the accelerometers and to the roll RJS synchro-detectors.
- -15VDC supply to the roll axis in order to take into account the roll follow-up signal generated by the roll axis,
- computation channel comparators indicate correct condition.

In addition to the above mentioned conditions and the ± 15 VDC coil supply, the axis healthy and engaged logic condition requires the logic conditions associated with high angle of attack yaw damping.
The anti high angle of attack active signal generation requires :
- associated ADC healthy signal (angle of attack generation for an IAS lower than 270 Knots).
- + 15 VDC supply of pitch axis autostabilization correct (+ 15 VDC supply used for angle of attack potentiometer supply).

These signals are overriden in the following cases :
- IAS greater than 270 Kts
- one AP system is in LOC TRACK and GLIDE captured mode; this condition maintains AFCS independance from the ADC
- the other yaw axis autostabilization is neither engaged nor lost, so that yaw autostabilization is maintained.

NOTE : In these last two cases, the gain as a function of the angle of attack is cancelled.
Fulfilment of these logic requirements conditions open lanes A and A', and open lanes A and B (Ref. 22-22-00, Description and Operation).

3. Control Unit - Electric Trim
(Ref. Fig. 005)

A. Description

The electric trim control unit comprises two engage switches, 1 and 2 i.e one per lane. These switches are of the solenoid-held type, they are supplied with +15VDC and -15VDC generated in the computers from 115 VAC supply. Note that any switch jamming can be overriden by the pilot.

B. Operation

When an engage switch is placed in the ON position, an engage signal selects the appropriate lane. If the engagement is satisfactory, the logic of the system enables the two hold coils (control and monitoring) to be energized thus holding the switch in the ON or engaged position. Supply cut-out of only one coil causes the engage switch to fall to the OFF position (absence of -15VDC is "detected" by the engage logic associated with the lane selected). This causes the TRIM red warning light to illuminate on master warning panel in case of loss of both trim lanes.

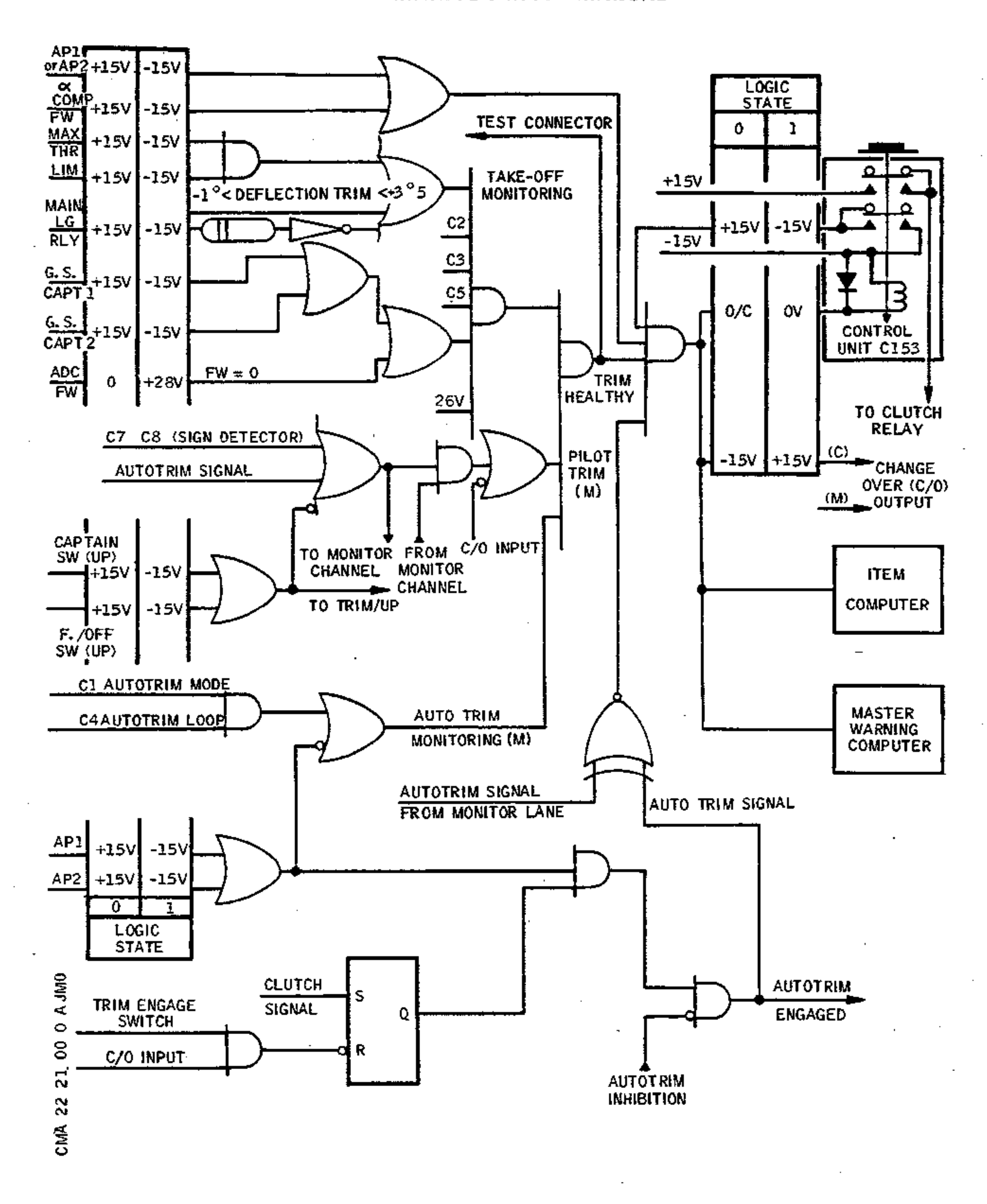
Each lane of the electric trim is considered as healthy when the following signals are present and correct :

- 26VAC-400Hz voltage signal,
- comparison signal (C2, M2) of stabilization functions
- comparison signal (C3, M3) monitoring the integrity of position-return demodulators and actuator clutch,
- comparison signal (C5, C6) monitoring the actuator control stage,
- comparison signal (C7, C8) monitoring the "Pilot Trim" circuits (sign detection of actuator rotation sense)
- comparison signal (C1, M1) and (C4, M4) monitoring the auto-trim circuits (pitch feel sensor and auto-trim loop) when either AP1 or AP2 is engaged.

- associated ADC operational signal. This signal is overriden when an AP is engaged in LOC TRK and in GLIDE captured mode.

- Non active angle-of-attack comparison signal from the ADC's. This signal is overriden on engagement of one AP.

- Out of trim monitoring signal at take-off. This signal takes into account the pitch trim trimmed position, the maximum thrust position of at least one throttle control



R

Electric Trim Engage Logic
Figure 005

lever and the main landing gear configuration.

AUTOSTABILIZER CONTROL UNIT - REMOVAL/INSTALLATION

1. General

R CAUTION : OBSERVE SAFETY PRECAUTIONS DESCRIBED IN 22-00-00,
R SERVICING.

R Autostabilizer control units Nos. 1 and 2 (1C32 and 2C32) are located on ceiling panel 4-211.
Their removal procedure is identical and is carried out separately.

2. Autostabilizer Control Unit

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.470 (14 ft. 8 in.)	
Electrical Ground Power Unit	
Circuit Breaker Safety Clips	

B. Prepare

(1) Trip, safety and tag the following circuit breakers :

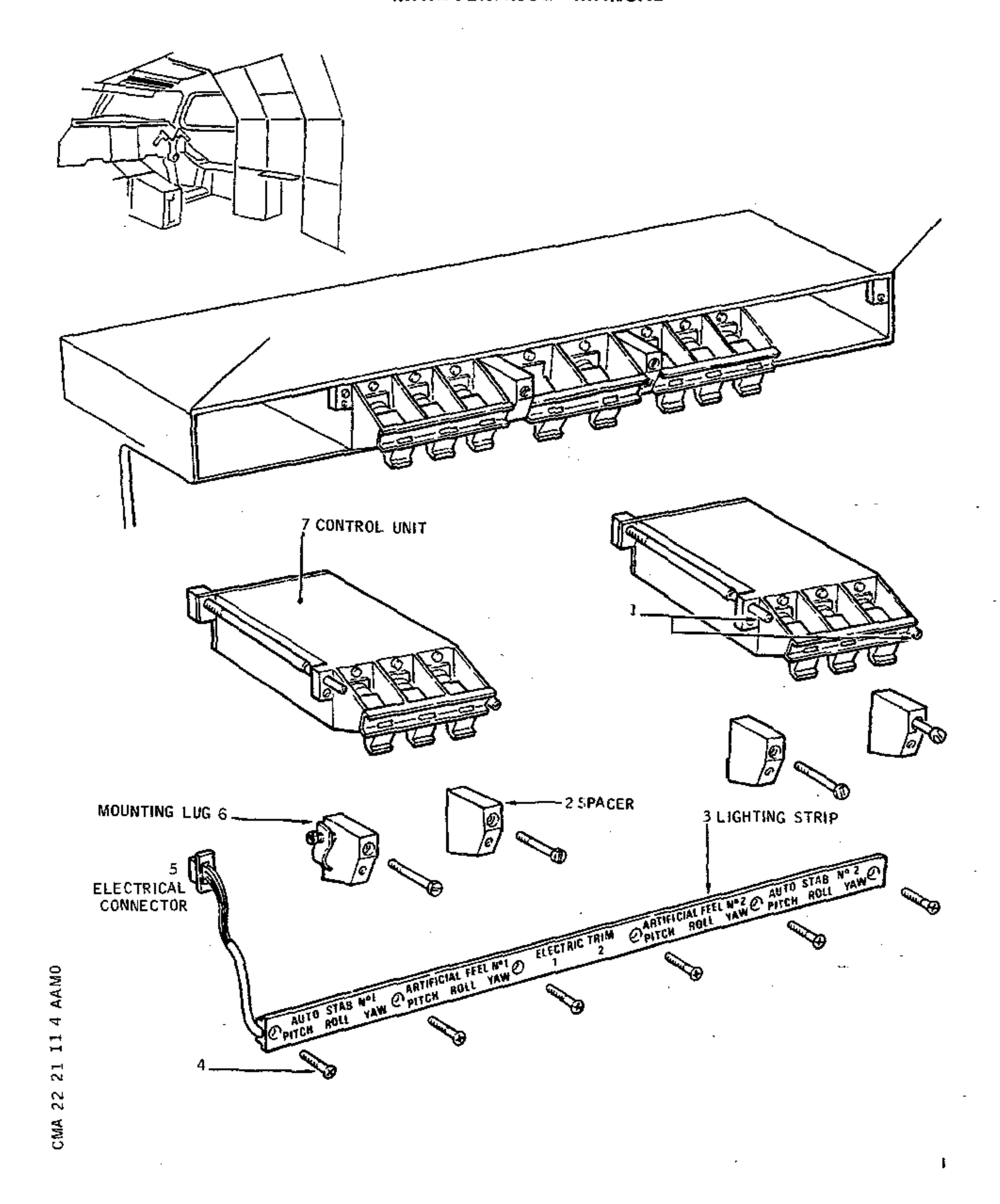
SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AUTO STAB 1 COMP SUP	2-213	1C 37	E 5
ROOF PML INST LTS SUP	13-215	L 379	F11
AUTO STAB 2 COMP SUP	13-216	2C 37	D17

C. Remove

(1) Remove mounting lug (6) on supply cable of lighting strip (3).

(2) Disconnect electrical connector (5) from lighting strip.

(3) Unscrew the 6 mounting screws (4) on lighting strip.



R Removal of the Autostabilizer Control Unit
Figure 401

NOTA : The lighting strip is reinforced by a U-shaped rail which is integral with the front section of the control unit. During removal, the lighting strip must be handled with care and positioned on its support as soon as possible.

(4) Remove lighting strip (3).

(5) Remove mounting screw from each of the two spacers (2) fitted on either sides of control unit (7), then retain them.

(6) Unscrew the 2 mounting screws (1) on control unit (7).

(7) Remove autostabilizer control unit.

D. Preparation of Replacement Component

(1) Make certain the autostabilizer unit has no shock or corrosion evidence and that the electrical connector is not damaged.

E. Install

(1) Position autostabilizer control unit (7) in its recess.

(2) Screw up the two mounting screws (1).

(3) Install then secure the two spacers (2).

(4) Position lighting strip (3) in its recess.

(5) Screw up the 6 mounting screws (4).

(6) Connect electrical connector (5).

(7) Secure mounting lug (6).

(8) Remove safety clips and tags and reset the circuit breakers previously tripped.

F. Tests

(1) Test of lighting strip

(a) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00,
R Servicing).

(b) On ceiling panel, in RH LIGHTING module, rotate the ROOF rotary switch.

(b1) The lighting strip illuminates (variation of light intensity).

(b2) Other caption lights may illuminate (disregard them).

(c) Place the ROOF rotary switch in OFF position.

(c1) The lighting strip extinguishes.

(c2) The other caption lights extinguish.

R (2) Control unit test (Ref. Adjustment/Test).

G. Close-Up

(1) De-energize the aircraft electrical network and dis-
R connect electrical ground power unit (Ref. 24-41-00,
R Servicing).

(2) Remove access platform.

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AUTOSTABILIZER CONTROL UNIT - ADJUSTMENT/TEST

1. General

WARNING : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

The purpose of the adjustment/test procedure described below is to make certain that the logic conditions required to allow the
R three PITCH, ROLL and YAW engage switches to be held in engaged position on each control unit are fulfilled.
R The test procedure being identical for each control unit, only
R control unit No.1 test is described while information concerning
R control unit No.2 is given in parentheses.

2. Operational test

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.470 m (14 ft. 8 in.)	
Electrical Ground Power Unit	
Circuit Breaker Safety Clips	

B. Prepare

(1) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
LAT ACCELMTR 1 26V SUP	2-213	1C 42	A 4
AUTOSTAB 1 COMP SUP		1C 37	E 5
LAT ACCELMTR 2 26V SUP	13-216	2C 42	B16
AUTOSTAB 2 COMP SUP		2C 37	D17

(2) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(3) At Flight Engineer's station, on EQUIPMENT BAY COOLING

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R panel, make certain that electronics rack ventilation
R is in operation (Ref. 21-21-00).

C. Test

(1) In flight compartment, on ceiling panel

(a) On flight control unit, make certain that ANTI-STALL SYSTEM No.1 and No.2 switches are in OFF position.

(b) On AUTOSTAB No.1 (AUTOSTAB No.2) control unit,
R engage the three PITCH, ROLL and YAW engage
R switches.

R (c) The three engage switches must remain engaged.

R (2) Trip and reset the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AUTO STAB 1 COMP SUP	2-213	1C 37	E 5
(AUTO STAB 2 COMP SUP)	(13-216)	(2C 37)	(D17)

R (a) The three PITCH, ROLL and YAW engage switches return to OFF position.

D. Close-Up

(1) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(2) Remove access platform.

ELECTRIC TRIM CONTROL UNIT - REMOVAL/INSTALLATION

1. General

R CAUTION : OBSERVE SAFETY PRECAUTIONS DESCRIBED IN 22-00-00,
R SERVICING.

R The electric trim control unit C153 is located on ceiling panel 4-211.

2. Electric Trim Control Unit

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.470 m (14ft. 8in.)	
Electrical Ground Power Unit	
Circuit Breaker Safety Clips	

B. Prepare

(1) Trip, safety and tag the following circuit breakers:

	SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
	TRIM COMP 1 SUP	13-215	1C 162	C 5
R	ROOF PNL INST LTS SUP		L 379	F11
	TRIM COMP 2 SUP	13-216	2C 162	E16

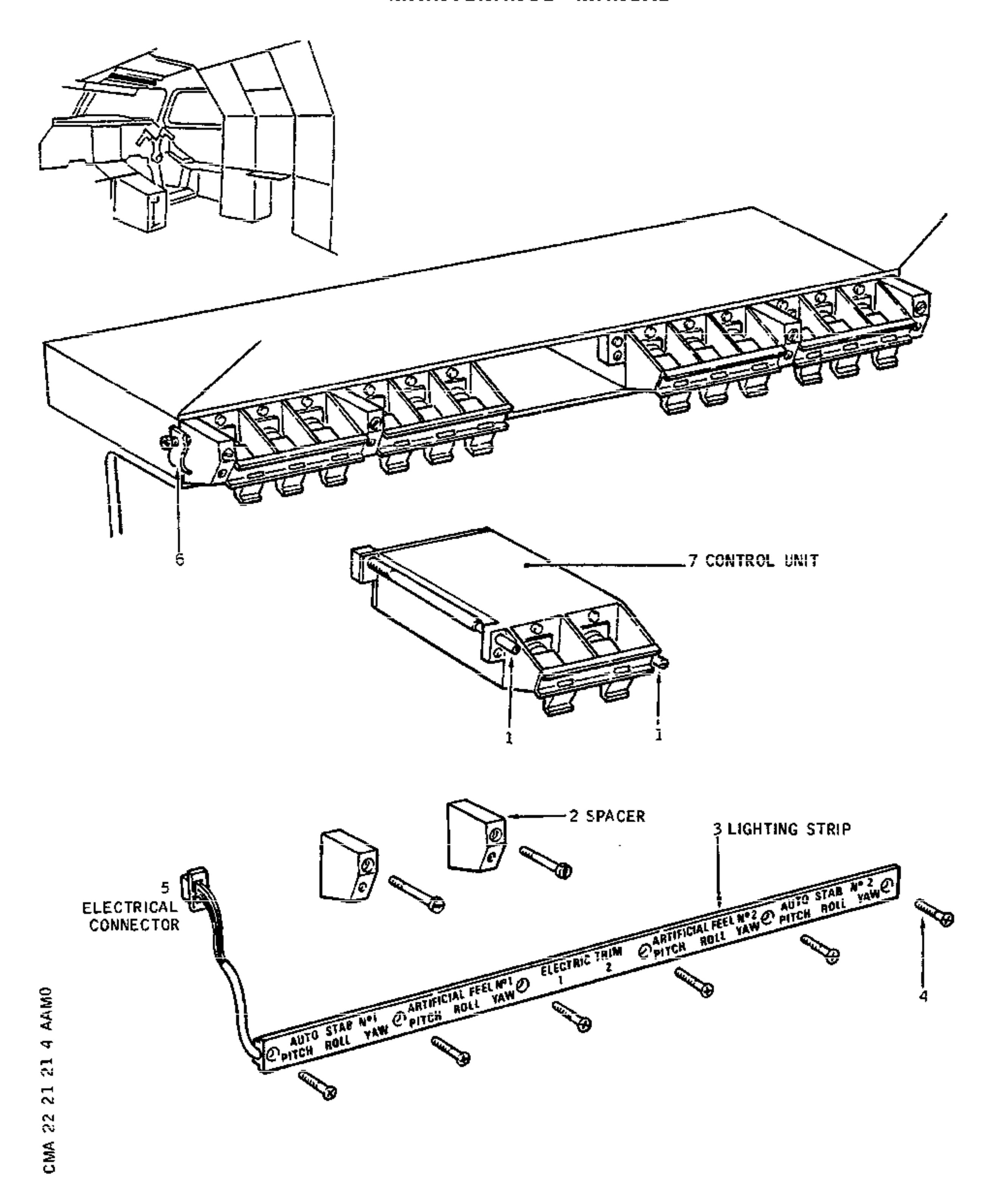
C. Removal

(1) Remove mounting lug (6) on supply cable of lighting strip (3).

(2) Disconnect electrical connector (5) from lighting strip

(3) Unscrew the six mounting screws (4) on lighting strip.

NOTE : The lighting strip is re-inforced by a U-shaped rail integral with the front section of the control units. During removal, the lighting



Removal of Electric Trim Control Unit
Figure 401

R

strip must be handled with care and positioned on its support as soon as possible.

(4) Remove lighting strip.

(5) Remove mounting screw from each of the two spacers (2)
R fitted on either side of control unit (7) then retain
R them.

(6) Unscrew the two mounting screws (1) on control unit (7).

(7) Remove electric trim control unit (7).

D. Preparation of Replacement Component

(1) Check electric trim control unit and electrical connector for corrosion or damage.

E. Install

(1) Position electric trim control unit (7) in its recess.

(2) Screw up the two mounting screws (1).

(3) Install then secure the two spacers (2).

(4) Position lighting strip (3) in its recess.

(5) Screw up the six mounting screws (4).

(6) Connect electrical connector (5).

(7) Secure mounting lug (6).

(8) Remove safety clips and tags and reset the circuit breakers previously tripped.

F. Tests

(1) Lighting strip tests.

(a) Connect electrical ground power unit and energize the aircraft electrical network
R (Ref. 24-41-00, Servicing).

R (b) On ceiling panel, on right hand LIGHTING unit, rotate ROOF rotary switch.

(b1) The lighting strip illuminates (illumination variation).

(b2) Other caption lights may illuminate (dis-regard them).

(c) Place the ROOF rotary switch in OFF position.

(c1) The lighting strip extinguishes.

(c2) The other caption lights must extinguish.

R (2) Control Unit Test

R (Refer to Adjustment/Test)

G. Close-Up

(1) De-energize the aircraft electrical network and discon-nect electrical ground power unit (Ref. 24-41-00,,
R Servicing).

(2) Remove access platform.

ELECTRIC TRIM CONTROL UNIT - ADJUSTMENT/TEST

1. General

WARNING : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

The purpose of the adjustment/test procedure described below is to make certain that the logic conditions allow holding of electric trim control unit switch 1 and switch 2 in engaged position.

2. Operational Test

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.470 m (14 ft. 8 in.)	
Electric Ground Power Unit	
Circuit Breaker Safety Clips	

B. Prepare

(1) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ADC 28V SUP	1-213	1F 74	P12
TRIM1 CONT		1C 161	Q11
AT CONT		1C 180	Q12
AFCS 1 CONT		1C 19	Q14
ADC1 26V SUP	2-213	1F 78	A 2
ADC1 115V SUP		1F 73	F 3
AFCS 2 CONT	5-213	2C 19	A12
AT CONT		2C 180	A14
TRIM 1 CONT		2C 161	B13
ADC2 28V SUP		2F 74	F12
TRIM COMP1 SUP	13-215	1C 162	C 5
TRIM SYNCHRO SYS1 SUP		1C 163	E 5

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
TRIM SYNCHRO SYS1 SUP	13-216	2C 163	A16
TRIM COMP2 SUP		2C 162	E16
ADC2 26V SUP		2C 78	F14
ADC2 115V SUP		2F 73	F15

(2) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

R (3) At Flight Engineer's station, on EQUIPMENT BAY COOLING panel, make certain that electronics rack ventilation is in operation.

(4) In flight compartment, on centre console

(a) On ADC control panel, make certain that TEST selector switches are in NORM position.

(b) Place ADC1 and ADC2 switches in ON position.

(c) If ADC1 and ADC2 caption lights illuminate, press them ; they must go off.

R (d) Set pitch trim control wheel to 0°.

(e) Set the four throttle control levers to Idle stop position.

C. Test

(1) Three minutes after the computers have been energized : on ceiling panel, on ELECTRIC TRIM control unit, engage switch 1 :

R (a) Switch must remain engaged.

R (b) On centre console, pitch trim control wheel must not rotate.

(2) On ceiling panel, on ELECTRIC TRIM control unit, engage switch 2 :

(a) Both switches must remain engaged.

(3) Trip, safety and tag the following circuit breaker :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
TRIM COMP1 SUP	13-215	1C 162	C 5

(a) Switch 1 falls to OFF.

(b) Switch 2 must remain engaged.

(4) Trip, safety and tag the following circuit breaker :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
TRIM COMP2 SUP	13-216	2C 162	E16

(a) Switch 2 falls to OFF

(5) Remove safety clips and tags and reset the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
TRIM COMP1 SUP	13-215	1C 162	C 5
TRIM COMP2 SUP	13-216	2C 162	E16

(6) On ADC control panel, place ADC1 and ADC2 switches in OFF position.

D. Close-Up

(1) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(2) Remove access platform.

AUTOSTABILIZATION - DESCRIPTION AND OPERATION

1. General

The aircraft is equipped on its three axes with an autostabilization (AS) system primarily intended for damping aircraft response to various aerodynamic disturbances in order to improve the aircraft flight performance within the whole flight envelope. In addition, the autostabilization system reduces yaw cau- caused by engine failure or by high angle-of-attack manoeuvre (automatic counteraction) and carries out turn coordination automatically in all the flight envelope on pilot roll order.

The autostabilization system is part of the AFCS. Though independent of the other AFCS systems, it affects AP/FD engagement conditions. In order to increase safety and reliability, the system is made up of two identical lanes.

Each lane consists of three sub-systems, one for each autostabilization axis. From the functional point of view, these subsystems related to the three axes are electrically independent of each other. Each sub-system has two independent channels, control and monitoring, which receive the aircraft angular velocity detection signal generated by a rate-gyro cvommon to both channels.

In normal operation, both lanes are engaged. Lane 1 has priority over lane 2 which is in standby. The signals generated by the computers are directly applied to the flight control channels in the power flight control units (PFCU) via amplifiers in the computers (Green amplifiers in the lane 1 computer, Blue amplifiers in the lane 2 computer). They do not act directly on the flight control system, thus the autostabilization (except turn coordination) may be overridden by the pilot.

The autostabilizer system can be checked on the ground and monitored in flight by means of the Integrated Test and Maintenance System (ITEM).

On the ground, the ITEM checks the three sub-systems (or three axes) in the analog computation and the monitoring circuits separately by means of the self test circuits.

In flight, the ITEM ensures constant monitoring of the system safety devices and memorizes all failures.

In the case of total loss of autostabilization for one axis, an aural and visual warning informs the pilots.

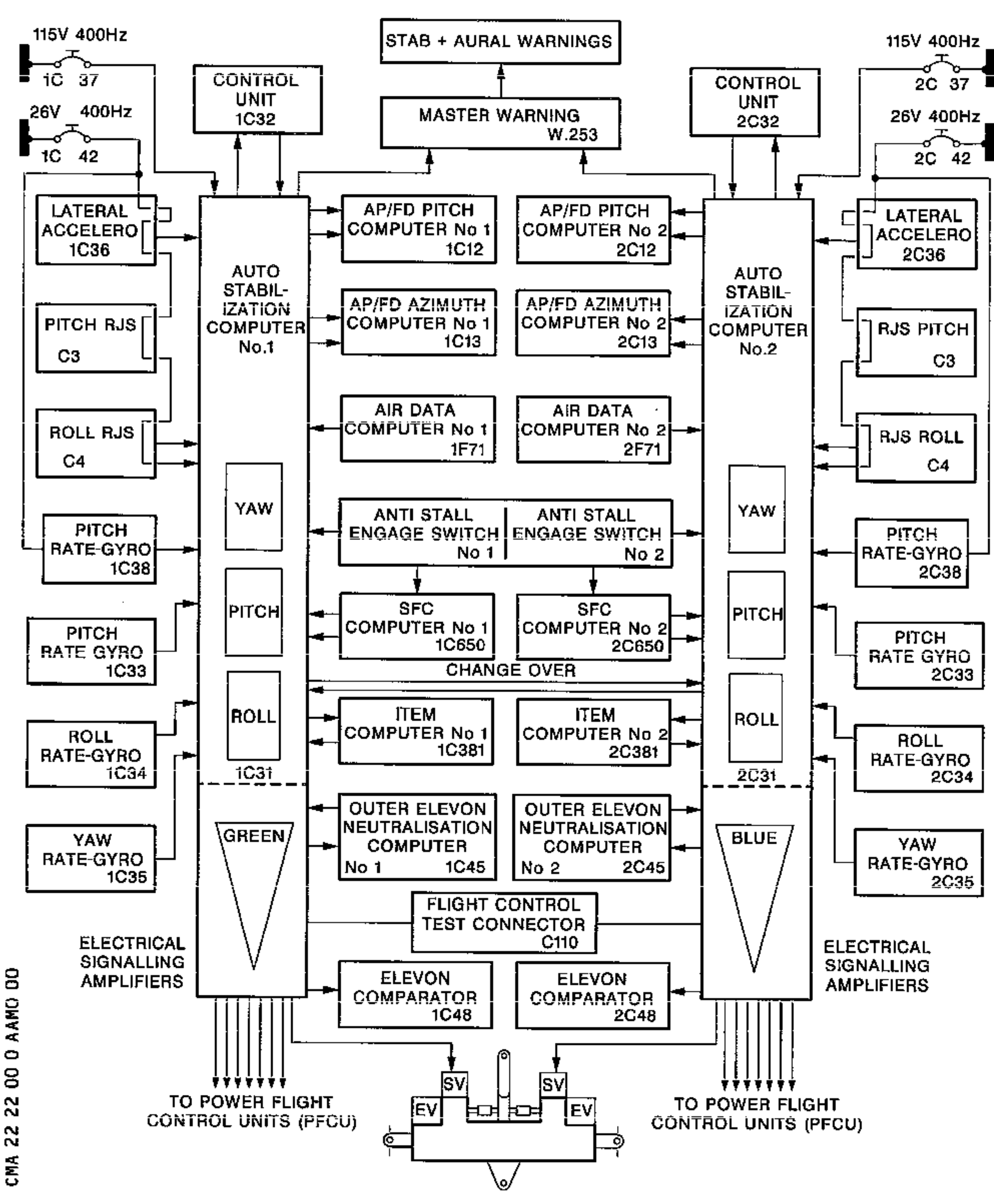
2. Description

(Ref. Fig. 001)

R The components comprised in lane 1 are arranged on the Captain's
R side and those comprised in lane 2 on the F/O's side.

R The autostabilization system for the three axes consists of :

R - Two computers (1C31) and (2C31) located in shelves 8-215 (LH
R side) and 8-216 (RH side) respectively of the electronics rack.
R - Two AUTO STAB No.1 and No.2 control units (1C32) and (2C32)
R located on the ceiling panel in the flight compartment
R (Ref. 22-21-00, Description and Operation).
R - Two control rate-gyros (1C33) and (2C33) and two monitoring
R rate-gyros (1C38) and (2C38) associated with the pitch axis and located at frame 28.
R - Two rate-gyros (1C34) and (2C34) associated with the roll axis and located between frames 70 and 71.
R - Two rate-gyros (1C35) and (2C35) associated with the yaw axis and located at frame 38.
R - Two lateral accelerometers (1C36) and (2C36) used for the automatic compensation function and located between frames 51 and 52 above tank No.8.



R

Autostabilizer System Configuration
Figure 001

R In addition, each autostabilization computer is connected to the following components :

- Relay jack sensor (RJS) related to the roll axis and fitted on the associated relay jack.
- Air data computer (ADC) (Ref. 34-11-00, Description and Operation) for signals from Mach and angle-of-attack potentiometers
- R Safety flight control computer (SFC) (Ref. 27-39-00, Description and Operation) for superstabilization and emergency flight control functions.
- Azimuth autopilot computer (Ref. 22-13-00, Description and R Operation) which receives yaw angular velocity signals and lateral acceleration signals.
- Pitch autopilot computer (Ref. 22-12-00, Description and Ope- R ration) which receives pitch angular velocity signals and engage signals from the three autostabilization axes.
- ITEM computer (Ref. 22-42-00, Description and Operation).
- Master warning computer (Ref. 33-15-00 Description and Operation).
- Outer elevon neutralization computer (Ref. 27-16-00 and 27-36-00, Description and Operation).
- Elevon comparators (Ref. 27-17-00, 27-27-00, 27-37-00, Description and Operation).
- Junction box for flight controls test set.

3. Computers
(Ref. Fig. 002, 003 and 004)
(Ref. Fig. 005, 006 and 007)
(Ref. Fig.008 and 009)

A. Description

Each computer is contained in a case.

On the front panel are mounted two sockets, ZA and ZB, for test and maintenance, one elapsed time meter, supplied with 115 VAC, and two handling grips.

The rear face is fitted with two double rack connectors distributed in four groups, for connections to the aircraft electrical network.

B. System Components

Each computer comprises :

(1) Three six-board units which constitute the analog and logic (control and monitoring) computation circuits associated with the three axes.
The circuits for each axis are physically separated.

(2) Eight amplifier modules (electrical signalling amplifiers).

(3) Three power supply units (one per axis).

C. Analog Operation

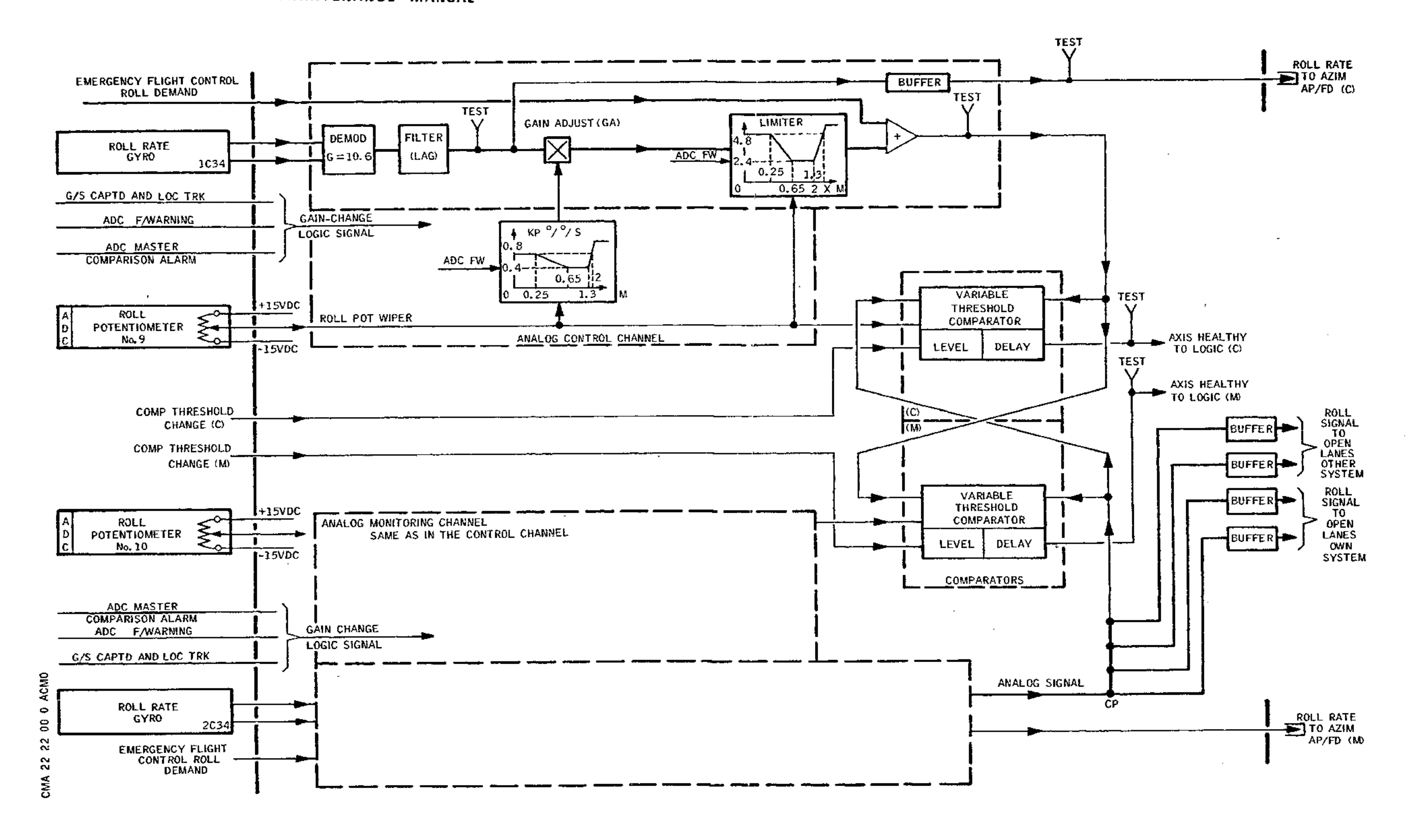
(1) Roll axis

The stabilization signals drive the PFCU's about the roll axis but only for the outer and middle elevons.

After having been demodulated and smoothed (structure filter), the resulting rate-gyro signal is transmitted via an adapter to the AP/FD (azimuth) on both control and monitoring channels and is also applied to an amplifier stage whose gain (Kp) varies as a function of Mach number. This signal passes through a limiter which generates a roll deflection order limited to 2.4° - 5.7°, depending on Mach number.

This deflection order is summed with the emergency flight control roll orders (provided that this SFC computer function is engaged) before being sent to the roll PFCU's via the open lanes in the electrical si-

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R

Roll Analog Sub-System
Figure 002

gnalling amplifier (E.SIG.AM.) modules.

In supersonic flight, the autostabilization is used above all to compensate roll caused by assymetrical opening of air inlet spill doors (engine failure).

The signals of the control and monitoring channels (C and M) are monitored by two identical comparators whose threshold is proportional to the roll limit and threshold increase signals (the latter being a function of emergency flight control). In the case of a discrepancy between these two signals on both the C and M channels, the comparators generate an axis disconnect order by sending an engage logic signal.

(2) Yaw axis

The stabilization signals drive the PFCU's (rudder) by means of a signal limited to 4 ° and consisting of : of :

- the turn co-ordination signal.
- the stabilization signals generated by the rate-gyros.
- the accelerometer signal used by the automatic counteraction function.

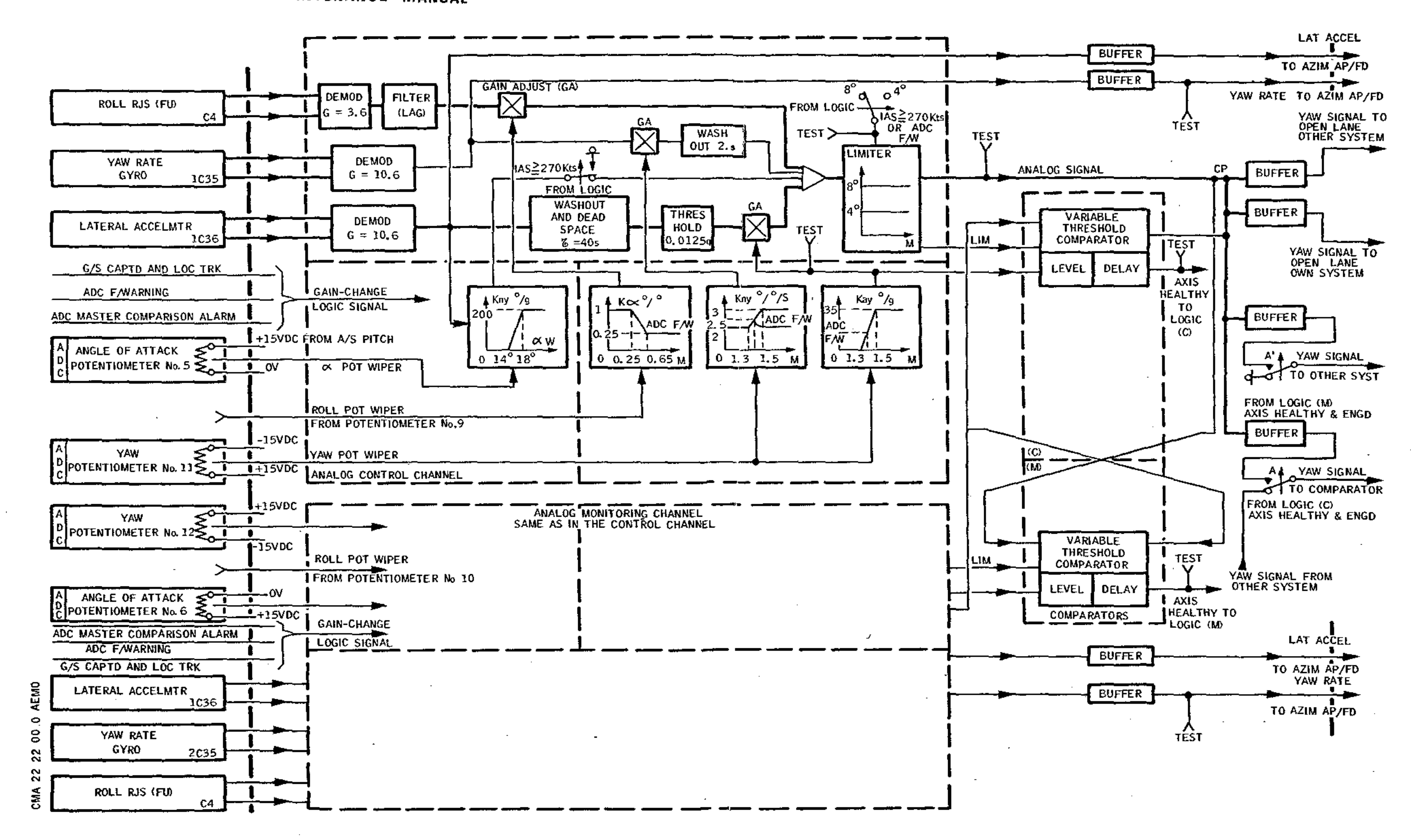
(a) Turn co-ordination

The turn co-ordination lines enable a maximum 1° per degree automatic deflection of the rudder control surfaces to be achieved up to Mach 0.25. In automatic flight, the actual coordination for a Mach value smaller than 0.25 is reduced to 0.5° per degree by means of the automatic pilot inner loop (counter coordination).

When the Mach value exceeds 0.65, the relay jack position signal is always sent via the position sensor (roll follow up) into the yaw stabilization sub-system. When this value is reached, the deflection decreases to 0.25 ° per degree.

This signal, after having been demodulated and smoothed (structure filter), is applied to an amplifier stage whose gain (Kx) varies with Mach number, as described above. After being summed with the yaw stabilization signal, it goes through a 4° limiter (this 4° limitation is common to the co-ordination and stabilization orders), before being sent to the yaw PFCU via the open lanes in

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R

Yaw Analog Sub-System
Figure 003

the E.SIG.AM. modules.

(b) Rate-gyro channel

After having been demodulated and smoothed (structure filter), the resulting signal is sent to the azimuth AP/FD computer via an adapter and to an amplifier and filter circuit (high-pass filter) mounted in series. The gain (Kr) of the amplifier varies as a function of Mach number. The high-pass filter cancels the constant reverse deflection order for the rudder control surfaces during turns.

Therefore when a turn is started, the controlled rudder deflection is compensated by yaw autostabilization only during initiation and end of turn. This prevents the turn co-ordination from being altered by auto stabilization. The two-second time-constant of the high-pass filter is sufficient to enable the yaw stabilizer to be employed for its primary function, which is Dutch roll damping.

(c) Accelerometer line for the automatic counteraction functions.

- Automatic counteraction function in case of engine failure

This consists of a demodulator the output signal of which is sent to the azimuth AP/FD computer via an adapter and also to a high-pass filter whose time constant (40 sec.) is sufficiently high to ensure an adequate gain to the automatic counteraction in case of engine failure. This gives the pilot enough time to take over and achieve a rudder control surface deflection manually. The signal then goes through a threshold circuit which suppresses residual vibration signals, and is then applied to an amplifier stage whose gain (Kay) varies with Mach number. The deflection signal, before being summed with the co-ordination and stabilization signals, is proportional to the lateral load factor above a Mach value of 1.5 when the gain corresponds to 35° per g.

- Automatic high angle-of-attack counteraction function

This function is used to reduce slipping caused by

a high angle-of-attack manoeuvre.
The accelerometric signal from the line demodulator is applied to an amplifier stage whose gain (kny) varies as a function of the wing angle-of-attack from 14° to 18° wing angle-of-attack below 14°, the gain (kny) is zero.

When this function operates, i.e. IAS lower than 270 kts, the rudder operational limit is doubled, from 4° to 8°.

This function is cancelled when IAS is greater than 270 kts or in case of ADC failure (ADC F/W). Then gain (kny) is zero and rudder operational limit returns from 8° to 4°.

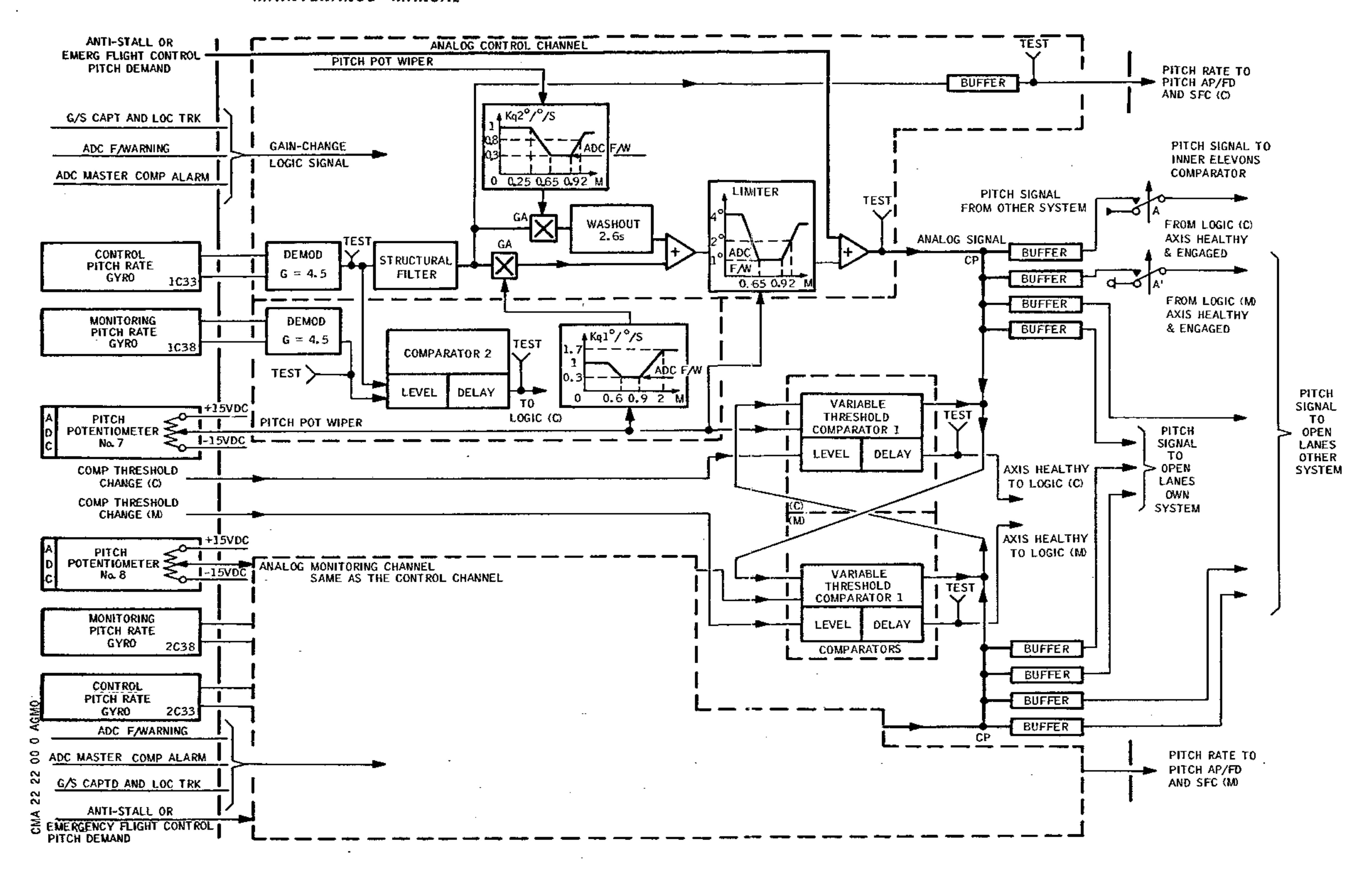
These control and monitoring channel signals (C and M) are monitored by two identical comparators whose threshold is proportional to the rudder operational limit and to the gain variation signal in the accelerometer line. Comparator threshold increase is achieved at Mach 1.3. If there is any discrepancy between C and M signals, the comparators issue an axis disconnect order in the form of a signal sent to the engage logic.

(3) Pitch axis

R The pitch axis sub-system drives the PFCU's (pitch) by means of stabilization signals generated by the rate-gyros.

R In order to avoid a pitch control rate-gyro failure (lane 1 or lane 2) a second monitoring rate-gyro is
R installed on each sub-system. The signals from these two rate-gyros are compared before being processed through the pitch autostabilization computation channels. In the case of a discrepancy between the rate-gyro signals, the pitch axis sub-system of the lane considered disengages by transmitting a failure signal to the engage logic of this sub-system. The comparator threshold is 1.5° per second.

After demodulation and smoothing through a band-pass filter (structure filter), the resulting rate-gyro signal is sent to the pitch AP/FD computer and the SFC through an adapter in the control and monitoring channels; it is also sent to two amplifier stages mounted in parallel whose gains Kq1 and Kq2 vary with Mach number.



R

Pitch Analog Sub-System
Figure 004

The kq2-gain amplifier is followed by a high-pass filter with a 2.6 sec. time-constant, so as to increase the effectiveness of stabilization.

The kq1-gain amplifier ensures a normal function.

The processed signals go through a limiter the effectivity of which varies from 1° to 4° over all Mach values. The effectivity limit increase is useful when the load factor varies rapidly (reduction of thrust of the four engines).

As with the roll axis, the autostabilization channels receive the emergency flight control orders. Furthermore, they route the superstabilization orders which are available only if the IAS is lower than 270 Kts and the angle-of-attack greater than 14 degrees. These orders are summed with the autostabilization signal before being sent to the pitch PFCUs via the open lanes in the E.SIG.AM. modules.

The control and monitoring channel signals (C and M) are monitored by two identical comparators whose threshold is proportional to the pitch limit signal and to the threshold increase signal. (This signal depends either on the (pitch) emergency flight control function or the superstabilization function). In the case of a discrepancy between the C and M channel signals, the comparators issue an axis-disconnect order in the form of a signal sent to the engage logic.

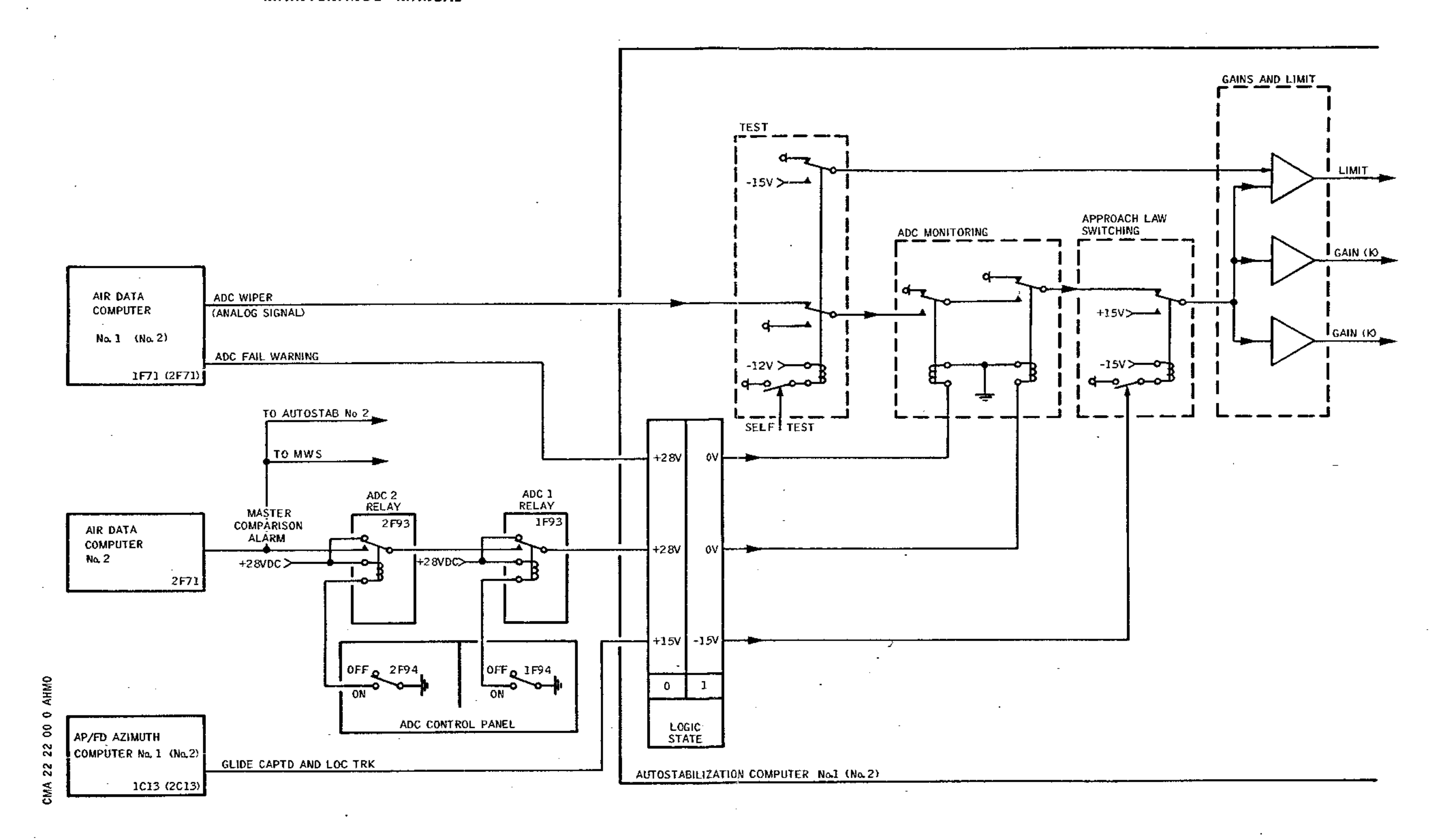
(4) Gain changes and Mach function limits

Gains and limits are generated from a signal which varies according to the Mach number ; this signal is then applied to the analog computation channels about the three autostabilization axes. About pitch and roll axes, gains and limits are doubled at Mach 2.
During approach, i.e. when GLIDE SLOPE capture and LOCK TRK are achieved with AP1 or AP2 engaged, as well as when an ADC failure is detected, gains and limits become constant and have the following values.

(a) Approach : values corresponding to Mach number of 0.

- Yaw : minimum gains ; automatic counteraction function against high angle-of-attack slipping maintained.
- Roll and pitch : maximum gains and limits.

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Principle of Generation for K Gain and Limit Changes
Figure 005

(b) ADC failure

- Yaw : intermediate gains (Mach number of 1.4) ; the automatic counteraction function against high angle-of-attack slipping is cancelled.
- Roll and pitch : minimum gains and limits.

If the ADC failure occurs during approach, with one AP engaged and in LOC TRK and GLIDE SLOPE capture, the values are those associated with M = 0.

(5) PFCU amplifiers

(a) Description

Each of the eight PFCU amplifiers included in each computer is contained in a case fitted with a handling grip. Each one contains its own power supply and computation circuits. They are linked to the control surfaces as follows :

- Two amplifiers for the outer elevons (RH and LH)
- Two amplifiers for the middle elevons (RH and LH)
- Two amplifiers for the inner elevons (RH and LH)
- One amplifier for the lower rudder
- One amplifier for the upper rudder.

(b) Operation

(b1) Open lanes

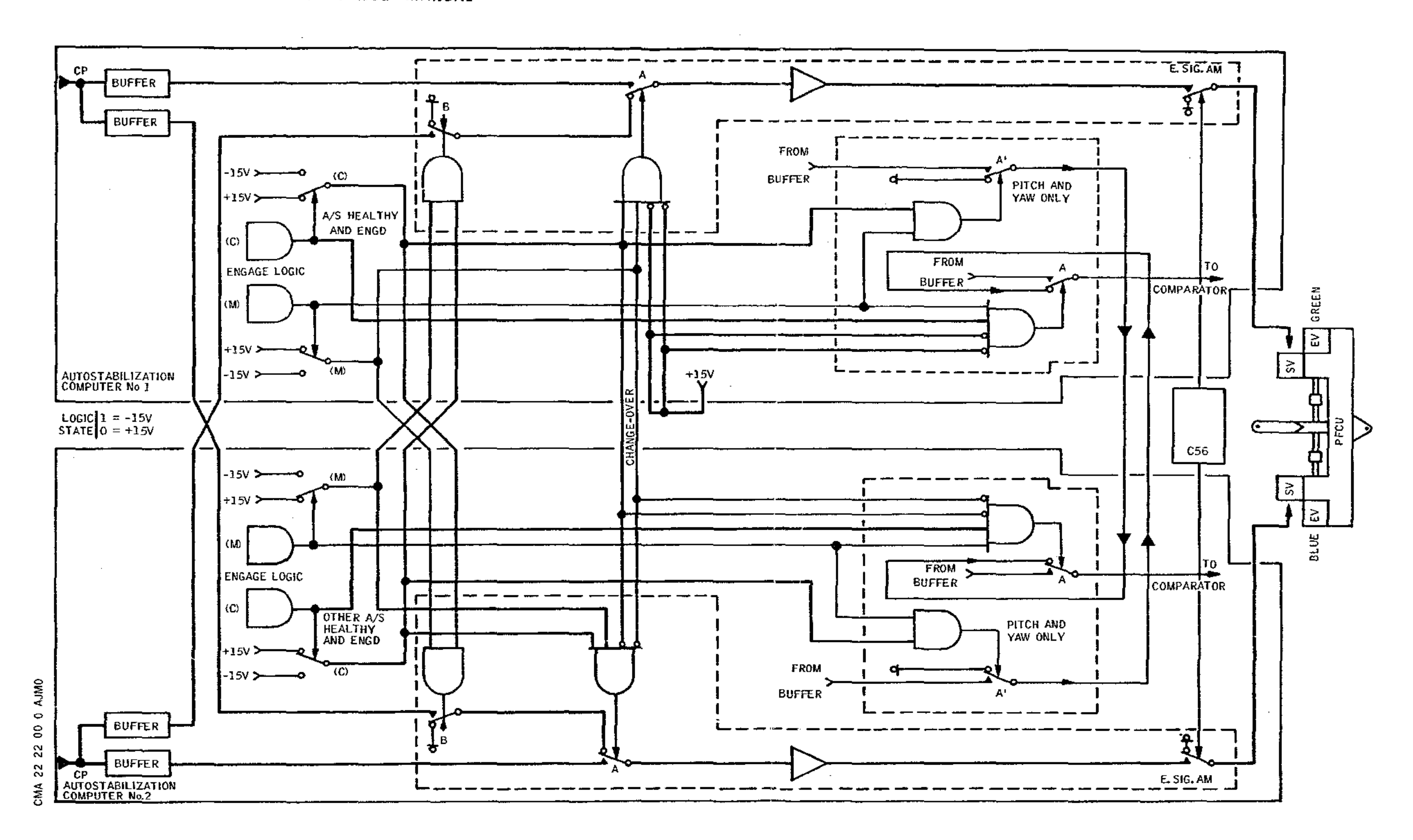
Signals issued from consolidated points of the autostabilization system are sent to the flight controls through relay assemblies called "open lanes".

The "open lanes" do not affect the independence of the three autostabilization axes. For a given axis, the relays are controlled by a unique signal generated by the monitoring logic of an AS axis considered as "healthy and engaged" (Ref. 22-21-00, Description and Operation).

Two types of open lanes are used :

Open lanes of the first type are printed on the logic circuit-boards for the yaw and pitch axes. These open lanes depend on 15 VDC

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R

Open Lanes Configuration
Figure 006

R supply from the power units. They allow the autostabilization analog signal to be applied to the comparators depending on the electrical mode in operation.
Open lanes of the second type are found in the electrical signalling amplifier (E.SIG. AM.) modules of the three axes. These open lanes depend on the 26 V 1800Hz supply, which after transformation and rectification, supplies direct current (±12V) to the open lanes. They autorize application of the autostabilization analog signal to the PFCU's depending on the electrical mode in operation

The controlled relays determine the operational conditions of the "open lanes".

- If both AS lanes, 1 and 2, are healthy and engaged, the outputs of lane 1 feed the Blue and Green sides of the flight controls The outputs of AS lane 2 remain open (non activated).

- If AS lane 1 is healthy and engaged and AS lane 2 defective or disengaged, the outputs have the above configuration.

- If AS lane 2 is healthy and engaged and AS AS lane 1 defective or disengaged, the outputs of AS lane 2 feed the Blue and Green sides of the flight controls.
  The outputs of AS channel 1 remain open.

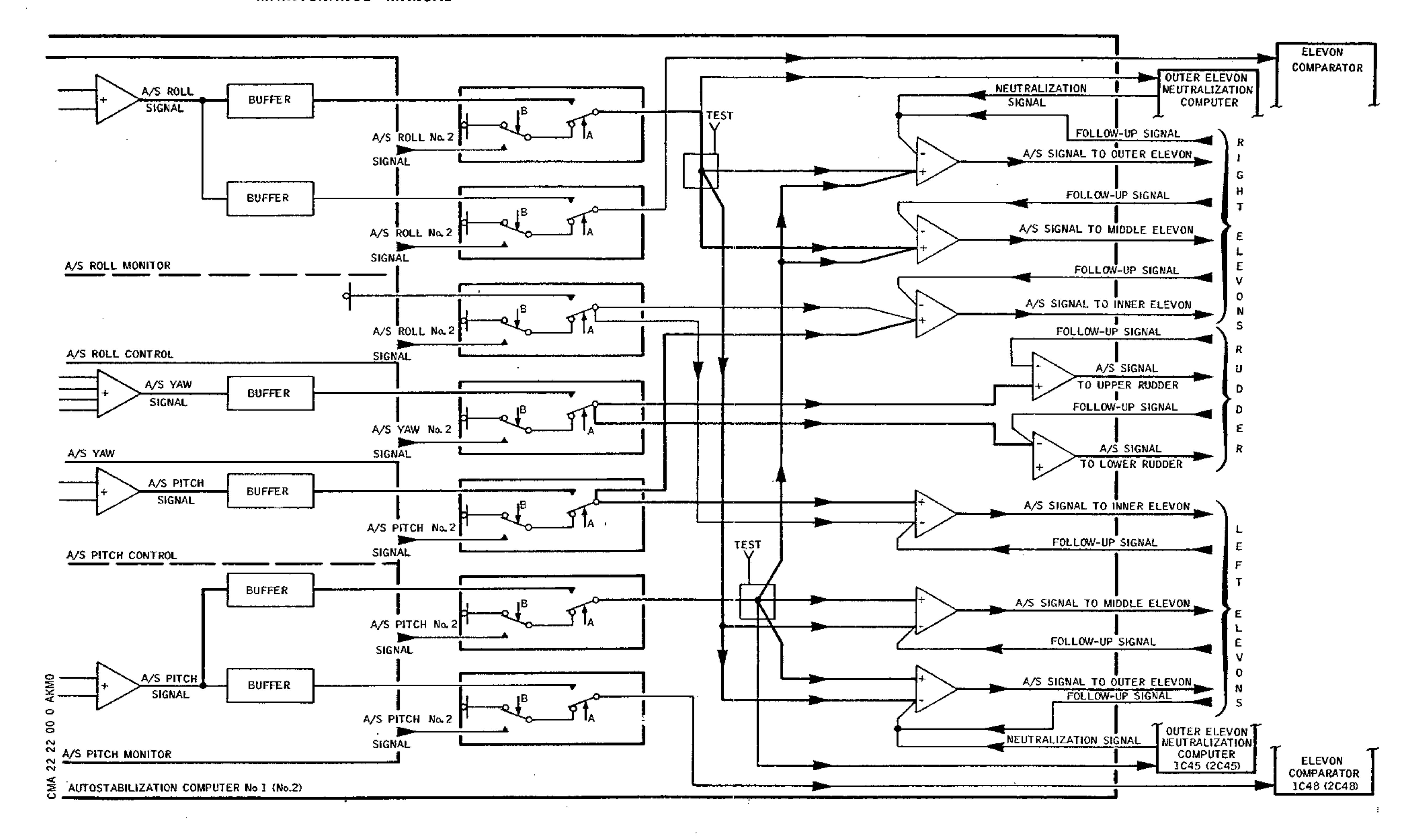
(b2) Amplifier

Each PFCU amplifier receives autostabilization orders generated by one or more of the three axes, depending on the associated control surface.

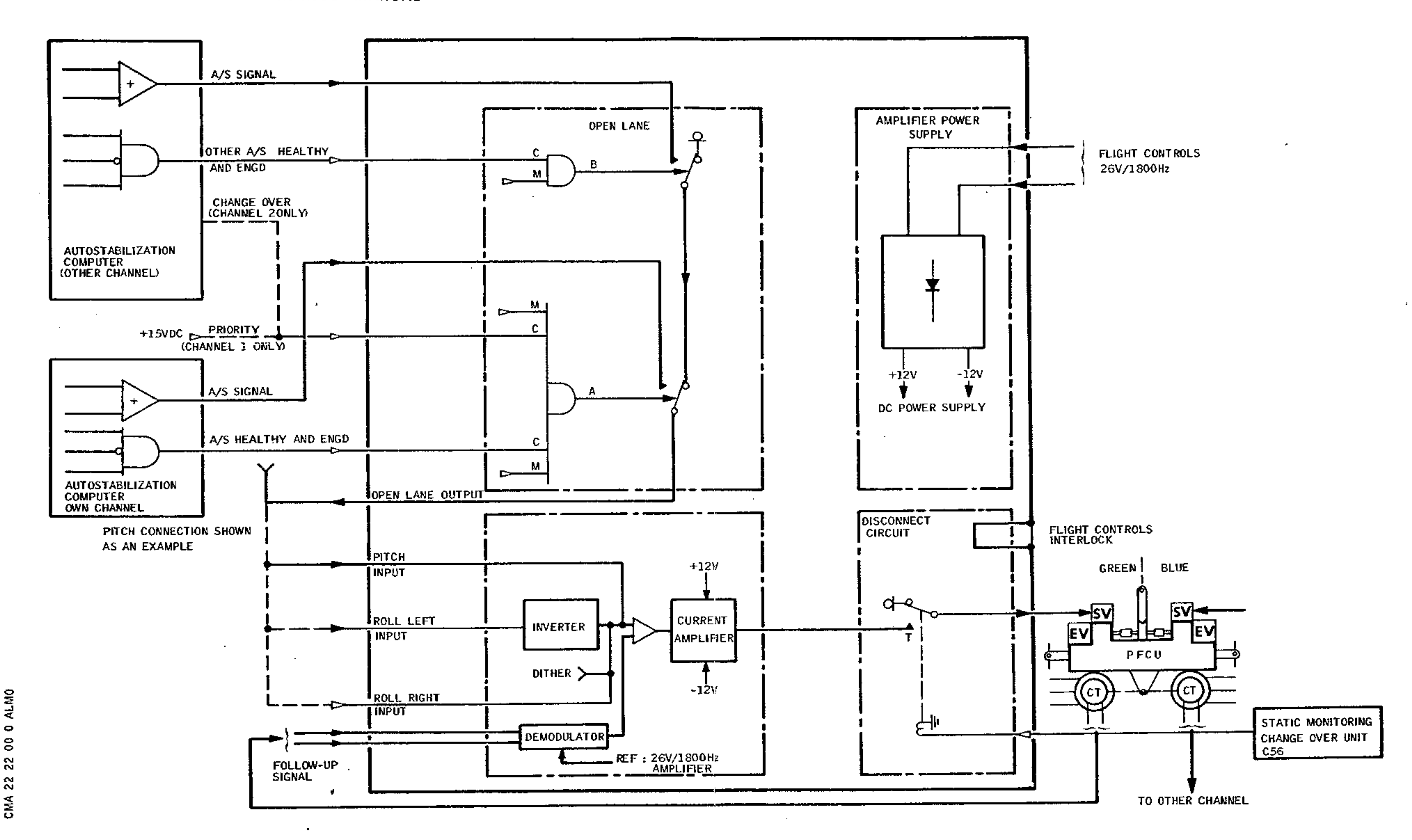
- Outer and middle elevons : pitch and roll orders
- Inner elevons : pitch order
- Rudder control surfaces : yaw order.

The autostabilization orders issued by open lanes associated with the elevons or rudder control surfaces are applied to the input of a summing amplifier to be added to the PFCU electrical error signal (position follow up signal). The output signal of the summing

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R Open Lanes - Interconnection
Figure 007



CMA 22 22 00 0 ALMO

R

Electrical Signalling Amplifier Operation
Figure 008

amplifier is applied to the PFCU servo valve through a current amplifier.

A 120 Hz-signal (dither) generated in the autostabilization computer is constantly applied to the servo valve.

(b3) Elevon monitoring - Disconnection

The flight control system comprises a feature which monitors the control surface positions and detects excessive differences between the controlled and actual positions. For this, special open lanes send the autostabilization order to the control surface comparators. For yaw orders and pitch orders
R (the latter routed to the inner elevons) these open lanes are fitted in the logic boards of the computers.

Depending on whether the Blue or Green flight control channel is activated (or whether flight controls are in mechanical mode), the associated inputs of the PFCU servo-valves are connected to the amplifier outputs or grounded. This is achieved by means of a disconnect circuit operated by a 28 VDC voltage provided by the monitoring channel. Mode changes may be achieved separately on the outer, middle and inner elevons and on the rudder control surfaces.

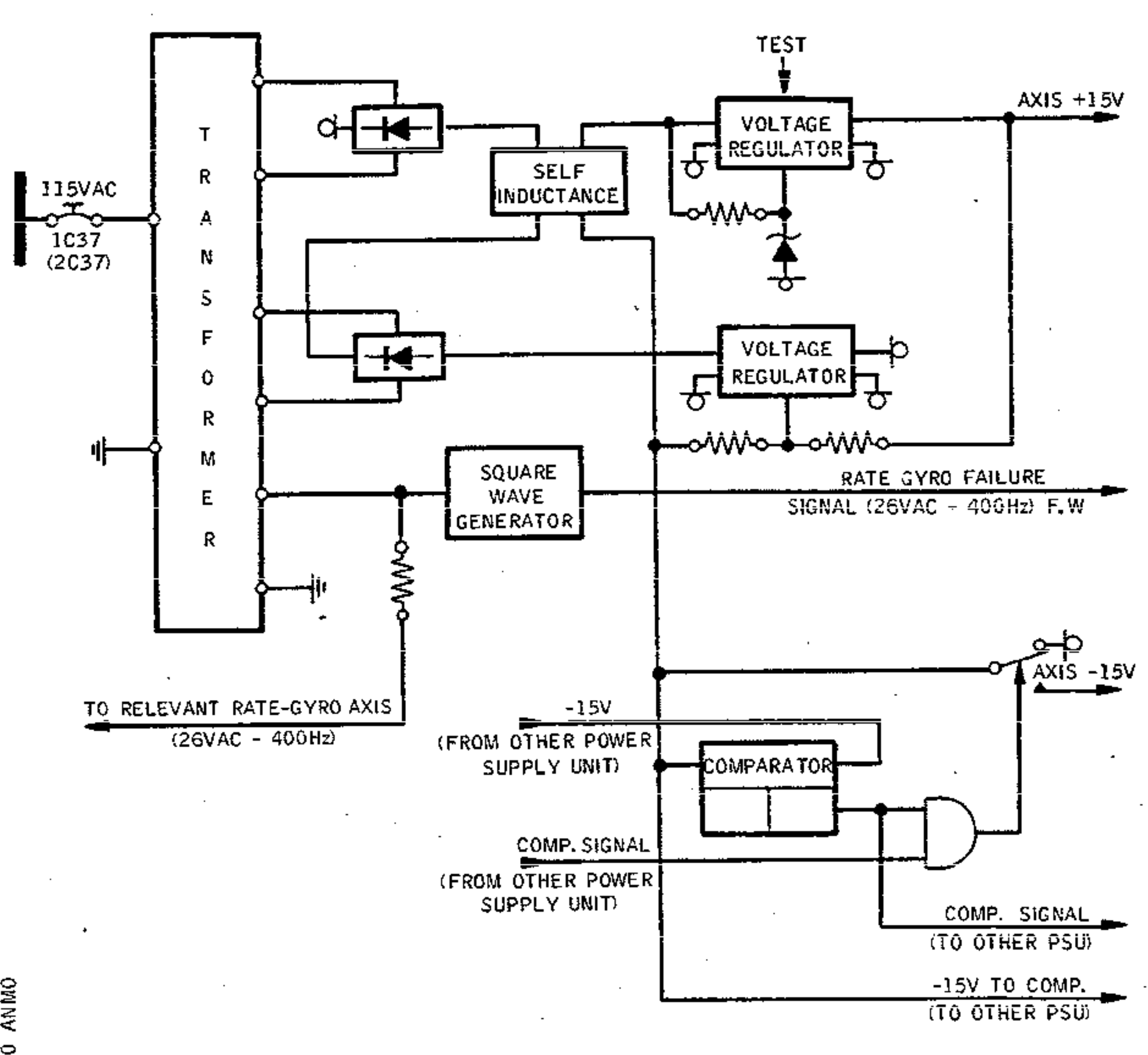
(b4) Outer elevon neutralization.

Orders from the roll and pitch axes are sent to the outer elevon neutralization computer which gradually suppresses the autostabilization orders sent to the elevons when the aircraft enters the peripheral flight envelope, i.e. when the difference between the IAS and the Maximum Allowable Airspeed (VMO) is greater than 25 knots (IAS - VMO greater than 25 kts).

(6) Power supply unit

In each computer, three power supply units are found. Each autostabilization computer is connected to the following power supplies :

- 115 VAC/400 Hz through circuit breaker 1C37, lane 1



CMA 22 22 00 0 ANMO

R

Power Supply Diagram
Figure 009

or 2C37, lane 2.
- 26 VAC/400 Hz through circuit breaker 1C42, lane 1
R or 2C42, lane 2.

R From the 115 VAC/400 Hz supply, each power supply unit generates regulated DC voltages (+15 VDC and -15 VDC) used by the computation circuits and 26 VAC/400 Hz to supply the associated axis rate-gyro.

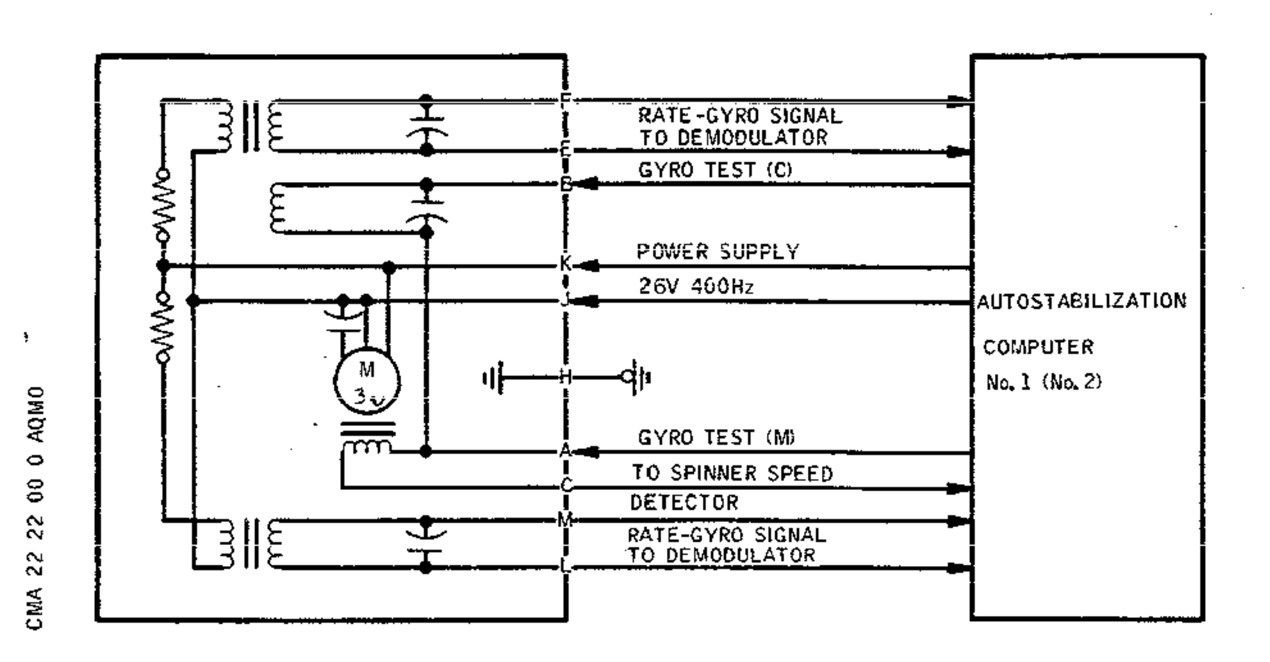
The +15 VDC and -15 VDC voltages from each of the three axes feed the associated Mach potentiometers of the ADC system as well as the associated control unit engage switches.

The ± 15 VDC of the pitch axis feeds the associated anti-stall system switch located on the ceiling panel; it also feeds the angle-of-attack potentiometer located in the associated ADC and the level detector for IAS greater than 270 kts located in the Safety Flight Control System (SFC).

The 26 VAC/400 Hz supply, generated by the aircraft, feeds the lateral accelerometers and the relay jack sensors (RJS) comprised in the relay jacks associated with the roll and pitch axes before being applied to the autostabilization computers where this voltage is monitored by the engage logic.

The monitoring pitch rate-gyros (1C38) and (2C38) are directly supplied with 26 VAC/400Hz from the aircraft electrical network.

4. Rate-Gyros
(Ref. Fig. 010)



Rate-Gyro - Schematic
R Figure 010

A. Description

R Each autostabilization lane comprises, on each axis, one monitored rate-gyro provided with torsion bar return and hydraulic fluid damping. The input axis painted on the
R casing is aligned with the associated aircraft axis.

B. Operation

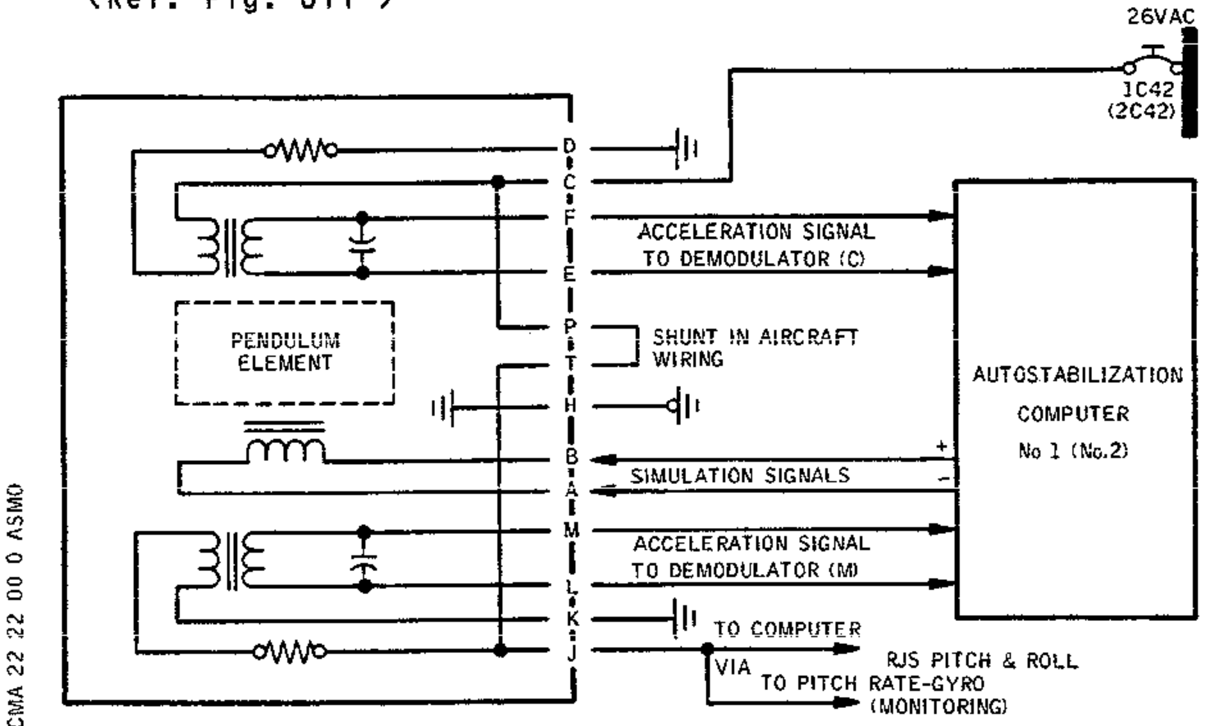
The rate-gyro consists of two inductive detectors connected
R respectivity to the monitoring and control channels of the autostabilization computer. Each detector provides a voltage
R proportional to the angular velocity sensed along the input
R axis. In order to eliminate undesired rotation velocities,
R the rate-gyros are installed at the anti-nodes of the lowest
R vibration frequencies, i.e. those corresponding to the de-
R viations to be corrected. The effects of higher vibration
R frequencies are eliminated by structure filters in the com-

R putation channels. A spinner rotation sensor sends a pulse
R train whose frequency is proportional to the spinner speed.

R When this equipment is in test operation, a coil energized by the computer enables precession speed to be simulated by
R modifying the rotation plane of the rate-gyro spinner.

R Rate-gyro integrity is monitored by the computers which
R compare control and monitoring rate-gyro signals and monitor the spinner speed value as well as the presence of the
R the 26 VAC/400 Hz aircraft supply used by the rate-gyros.
R The rate-gyro output gradient is 180 mV per degree per
R second.

5. Accelerometer - Lateral
(Ref. Fig. 011)



R Accelerometer - Schematic
Figure 011

A. Description

R Each yaw axis autosbilization sub-system includes a monitored accelerometer which consists of a pendulum element suspended within a movable frame provided with one degree of
R freedom and torsion-bar mechanical return. The axis to which
R it is sensitive, shown on the casing, coincides with the aircraft pitch axis.

B. Operation

The accelerometer consists of two inductive sensors respec-
R tively connected to the control and monitoring channels of the autostabilization computer. Each sensor provides a vol-
R tage proportional to the acceleration detected along the
R sensitive axis. In order to suppress undesirable inputs such
R as structural accelerations and those caused by aircraft ro-
R tation about its C.G., the accelerometers are installed at

R the mode of the lowest transverse frequency vibrations and
R close to the average C.G. of the aircraft Undesired vibra-
R tions of higher frequencies are filtered out in the respec-
R tive computation channels through a threshold filter.

R In the test phase of this equipment, a coil energized by the computer enables an acceleration to be simulated by moving the mobile element of the accelerometer.

R Accelerometer integrity is monitored by the autostabiliza-
R tion computers which compare the control and monitoring
R accelerometer signals. Monitoring of 26 VAC/400Hz supply used by the accelerometers is achieved in the computers.
R This also indicates whether the accelerometers are properly
R connected to the autostabilization system. The accelerometer output gradient is 180 mV per 0.03 g.

R 6. Sensor - Relay Jack

This sensor comprises four synchro-detectors which generate a roll follow-up position signal for turn coordination.
Two synchro-detectors send signals to the control and monitoring
R channels associated with the AS lane 1 roll axis and the AP1
R azimuth channels. The two other synchro-detectors are linked to
R AS lane 2 and the AP2 azimuth channels.
The two synchro-detectors associated with lane 1 are fully isolated from those associated with lane 2.

These synchro-detectors are supplied in series with the accelerometers and the position synchro-detectors of the pitch and roll PFCU's. The gradient of the relay jack sensor synchro-de-
R tectors is 290 mV per degree.

7. Potentiometers - Angle-of-Attack and Mach

A. Mach Potentiometers

The Mach output shaft of each ADC system is used to drive six linear potentiometers. These potentiometers issue voltages enabling changes of gains, limits and comparator
R thresholds to be generated as a function of Mach.
The six potentiometers of each ADC are supplied with ± 15 VDC from the associated autostabilization computer.
R Potentiometers No.7 and No.8 provide the pitch limit and
R gain functions.
R Potentiometers No.9 and No.10 provide the roll limit and
R gain functions.
R Potentiometers No.11 and No.12 provide the yaw limit and
R gain functions.

R B. Angle-of-Attack Potentiometers

R Two linear potentiometers, No.5 and No.6, are used in the
R yaw axis sub-system for the gain change as a function of the angle-of-attack. They are supplied with 0 and + 15 VDC from the associated pitch axis sub-system.
Their characteristics are as follows :

- A 0 V voltage corresponds to a 10° negative wing angle-of-
R attack (0 V = - 10° wing angle-of-attack).
- A + 15 VDC voltage corresponds to a 25° positive wing
R angle-of-attack (+ 15 V = + 25° wing angle-of-attack).

These characteristics imply a wing angle-of-attack equal to
R ADC angle-of-attack of + 0° 30 minutes.

8. Operation
(Ref. Fig. 012, 013 and 014)

A. Principle

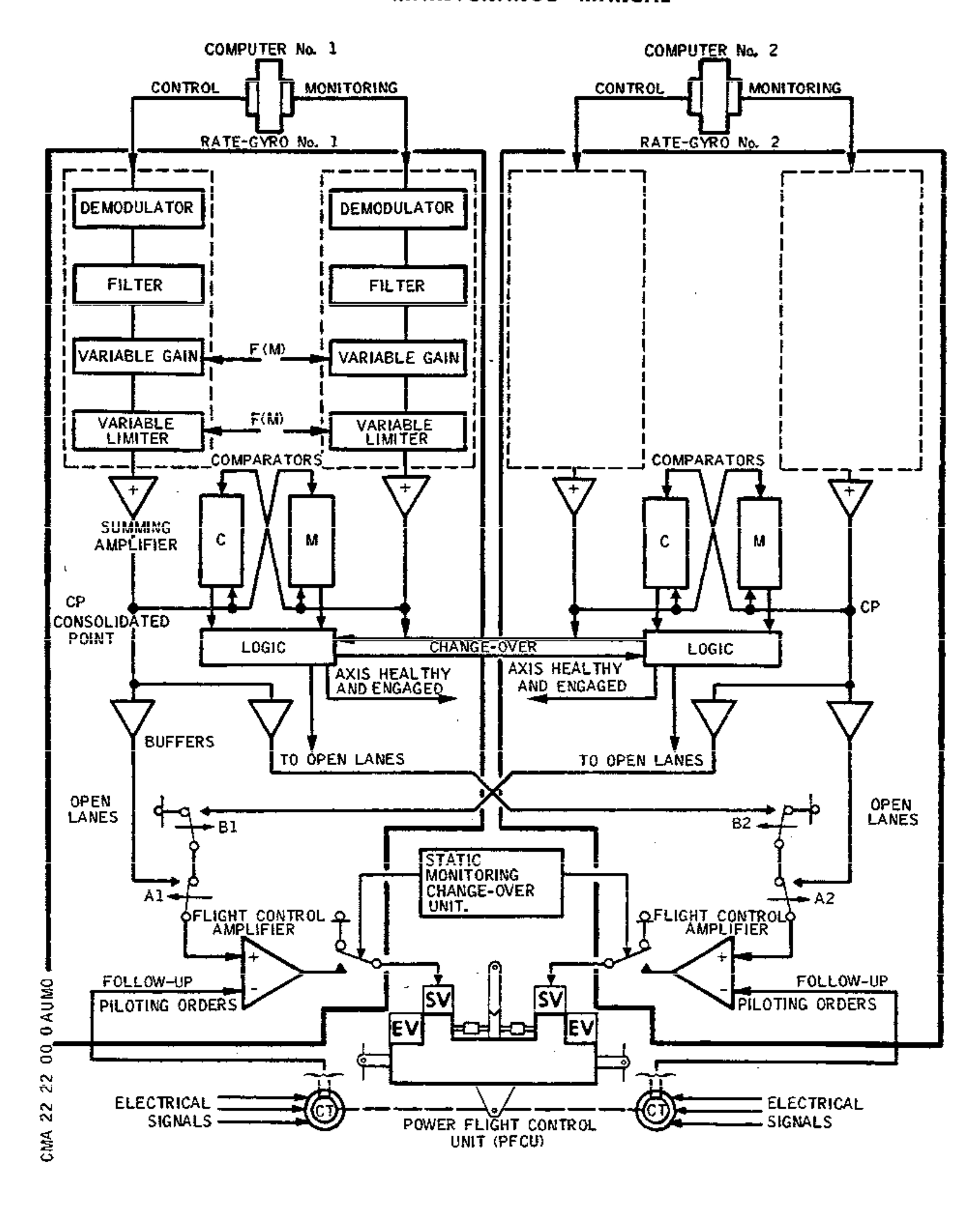
The three autostabilization axis sub-systems operate in the same manner. A rate-gyro which is the leading end of a feed-back loop, (the feed-back is provided by the aircraft itself) detects the angular velocity around its input axis. This signal is demodulated then smoothed through a structure filter in order to suppress signals originating from aircraft structural vibrations, so as not to feed them back to the aircraft (danger of oscillations). This signal is then amplified by an amplifier whose gain varies as a function of Mach number : the effectivity of this gain is limited in order to avoid transmission of too great a deflection signal when the autostabilization axis in operation is defective. The authority limit as well as amplification ratio are a function of Mach number.

A roll term proportional to the associated piloting order is summed with the yaw autostabilization order, to improve turn co-ordination. Within the yaw autostabilizer axis sub-system an acceleration-correction term is taken into account above a given threshold in order to compensate yaw caused by an engine failure. In addition, after going through the
R accelerometer demodulator, the accelerometric correction term enables yaw caused by high angle-of-attack manoeuvres to be reduced.

An additional term originating in the SFC computers (Ref. 27-39-00, Description and Operation) is summed with the roll and pitch autostabilization signals. For the pitch axis, this additional term corresponds either to the super-stabilization signal (IAS lower than 270 kts) or the emergency flight control signal according to the SFC configuration. For the roll axis, the emergency flight control signal only is summed with the autostabilization command signal.

The monitoring logic checks that all conditions required for the engagement of each axis sub-system are fulfilled and that the engage switch is held in the engaged position. This logic routes the analog signals associated with each axis to the PFCU amplifiers (electrical signalling amplifiers) via adapters and open lanes.

The amplifiers receive an error signal proportional to the difference between the actual and pilot-ordered control surface positions. The autostabilization order associated with the relevant axis is summed with this error signal.



R

Computation Channel - Schematic
Figure 012

The outer elevon amplifiers receive in addition a signal which suppresses pitch and roll orders when the speed of the aircraft is greater than VMO during peripheral flight. This neutralization order is generated by a computer.

B. Monitoring and Safeties

The purpose of the monitoring circuits is to ensure :

- The presence of the autostabilization signals on both Blue and Green flight control systems.
- Detection and suppression of faulty orders, the SFC being either active or inactive.
- Display of failures for the pilots.

The first two functions are achieved by the engage logic signal (Ref. 22-21-00, Description and Operation) and control of the open lanes. For each axis, the monitoring circuits are independent and duplicated, except for the roll axis supply failure which is detected by the yaw axis logic.

Each axis sub-system transmits its engage signal for control and monitoring channels :

- to the open lanes for that axis, and
- to the AP/FD, SFC, Master Warning and ITEM systems.

Engagement of one axis sub-system is carried out manually by means of the engage switch. The engagement ability depends on :

- failures specific to the autostabilizers (internal monitoring).

- the influence of the SFC.

- ADC failures.

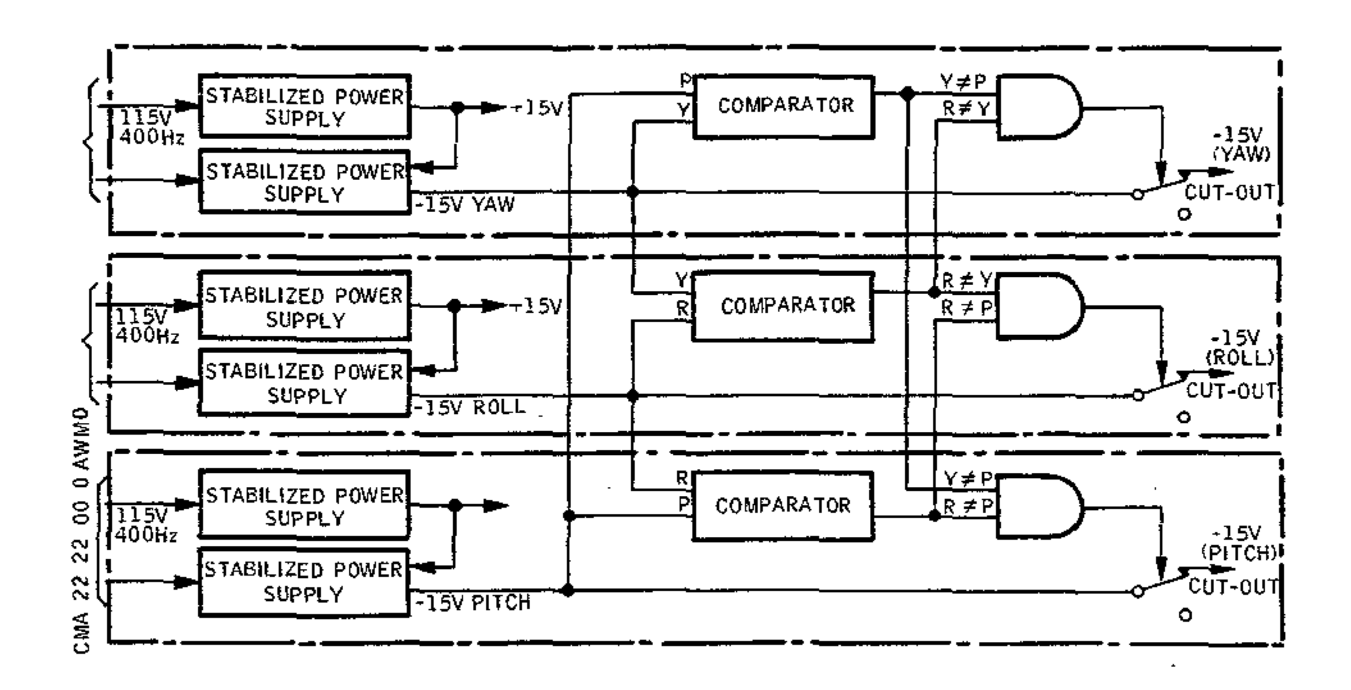
(1) Monitoring Circuit Description

For each axis, the monitoring circuits are duplicated and independent, except for power supply monitoring.

(a) +15 V and -15 V Power Supply Monitoring

The +15 V supply is regulated with respect to a reference voltage (zener diode).

The -15 V supply is regulated from the +15 V and consequently monitoring of the -15 V ensures that of the +15 V. This monitoring consists in compa-



Power Supply Monitoring Block Diagram
Figure 013

ing the -15V of the associated axis sub-system with the two -15 V of the other two axis subsys-systems. The comparator outputs are connected in pairs to an AND gate ; consequently when two com-parators are triggered, the AND gate disconnects the -15 V of the axis common to both comparators.

(b) Autostabilization system failures.

The calculations effected by the control channels are compared to those generated by the identical monitoring channels which utilize the second rate-gyro output. The orders computed by these two channels are sent to comparators which generate a logic signal (O) if the difference obtained by the comparison is greater than the thresholds (which are a function of Mach). For the pitch and roll axes, the thresholds are also a function of the angle-of-attack and of the emergency flight control engagement. In the yaw axis, the threshold depends on the IAS and Mach number.

R The associated logic detects comparison failures,
R 26 V 400 Hz supply and rate-gyro spinner speed
R failures for each autostabilization azis.
In the yaw axis, in addition to the common failures previously mentioned, the internal monitoring detects :

R - 26V/400Hz supply failure of the relay jack sensors, of the accelerometers and of the monitoring rate-gyros of the pitch axis.
R - Roll axis (-15V) supply failure, so as to avoid
R an overrun of the turn coordination channel.

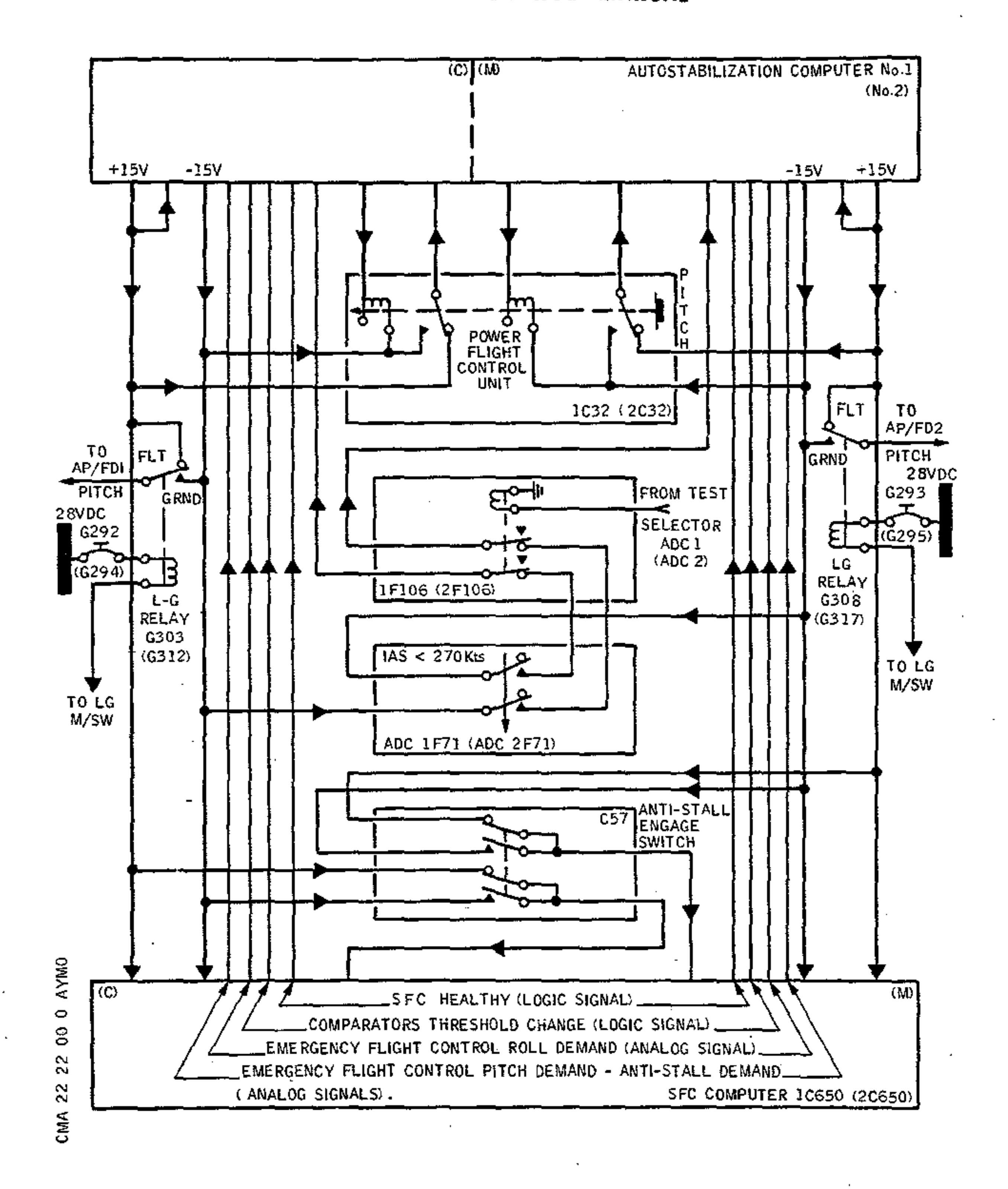
R Note that the comparators thresholds are doubled (as is the limit) when the angle-of-attack function becomes critical.
R Moreover, in order to maintain proper operation of the automatic counteraction in cases of high angles-of-attack, the axis engage logic circuits
R receive the associated ADC condition (angle of attack) and + 15 VDC pitch axis supply information. This voltage is used to supply the angle-of-
R attack potentiometers located in the associated ADC.
R In the pitch axis, in addition to monitoring of
R the common failures, special monitoring provisions enable detection of pitch axis rate-gyro spinner caging. The signals from the control rate-gyro, which provides the autostabilization orders, are
R compared with the signals from a second rate-gyro
R used for monitoring. In the case of discrepancy
R between these two signals, the comparators send a
R logic order, its logic status being 0, causing
R axis sub-system disengagement.

R (c) Effect of the SFC

The SFC system is used only by the roll and pitch
R axes. It affects comparator thresholds and enga-
R gement of the sub-systems of the three axes.

(c1) Roll axis

When the emergency flight control function is engaged, or when the angle-of-attack is equal
R to or greater than 14°, the roll sub-system comparators receive a -15 V signal which increases their threshold by approximately 0.65° of control surface deflection in order to avoid abrupt disengagement of the roll axis.



Autostabilization - SFC Interconnection
Figure 014

R

The signal is transmitted by the SFC to the control and monitoring comparators.
These signals are separated in the autostabilization computer and serve as monitoring signals for the axis engage logic.
R Failures which produce a difference between the threshold change signals cause disengagement of the roll axis sub-system.
This enables the three failures below to be detected :

- SFC supply failure
- Disengagement of pitch axis sub-system with emergency flight controls engaged.
- Failure of one of the two emergency flight control engage logics.

For these three failures the axis sub-system is disengaged and can not be re-engaged.

(c2) Pitch axis

SFC operation is influenced by the superstabilizer.

In emergency flight control, engagement of the axis sub-system and comparator threshold increase are carried out according to the same principle as that used for the roll axis. The threshold increase corresponds to 1.55° of control surface deflection. Failures which cause the pitch axis sub-system to disengage are :

- Failures common to both roll and pitch axes
- Emergency flight control function engaged with disengagement of the roll axis.

When the superstabilizer is engaged the thresholds are increased throughout the whole flight envelope when the angle-of-attack is greater than 14 ° in order to avoid disengagement of the pitch autostabilizer when the superstabilizer is operative.

In addition engagement of pitch autostabilization is affected by superstabilizer condition in different flight phases, in particular when the IAS is lower than 270 kts. Above this speed, the superstabilizer is inactive, inhibition being achieved in the autostabili-

zation computers. During automatic approach inhibition is carried out in the SFC computers.

Pitch autostabilization engagement can also depend on AS and superstabilizer capability. In fact, both systems operate in series since superstabilization orders are transmitted by the autostabilization system. As lane 1 has priority over lane 2 and in order to preserve superstabilizer capability if a failure occurs in superstabilizer No.1, it is necessary to disengage the pitch axis subsystem of lane 1 in order to engage the pitch axis sub-system of lane 2 and superstabilizer No.2 automatically.

(d) ADC failures

Each autostabilization computer receives two duplicated signals (control and monitoring) from the associated ADC.

(d1) The ADC failure signal corresponding to a failure of the ADC associated with the relevant AS lane.
This kind of failure affects only the AS lane associated with the defective ADC.

(d2) The ADC comparison failure signal associated with an unidentified ADC failure.
This kind of failure affects both lanes of the autostabilization system. It does not cause disengagement of the yaw axis.

In each autostabilization computer, the two signals are routed to the three axis subsystems where they control variable limit and gain circuits.

C. Warnings and Display

When a failure is detected, with both autostabilization lanes engaged, by the monitoring logic of one axis subsystem of one lane the engage switch returns to the OFF position, thus disengaging the axis sub-system. In addition, a logic signal is sent to the associated AP causing its disengagement.

Total loss of the autostabilization for one axis causes :

- the red STAB warning light on the master warning panel to illuminate.
- the single stroke gong to sound.

If both pitch axis sub-systems are disengaged and both superstabilizer systems are engaged, the amber SYS 1 FAIL and SYS 2 FAIL warning lights illuminate on the ceiling panel if the IAS is lower than 270 Knots.

The pilot knows which axis sub-system is defective by looking at the position of the associated engage switches.

The red STAB warning light can be re-armed by pressing it. SYS 1 FAIL and SYS 2 FAIL warning lights are extinguished by placing both superstabilizer ANTISTALL 1 and 2 switches in the OFF position.

If only one axis sub-system is lost in one lane, this is indicated by engage switch disengagement (falling). When a pitch axis sub-system is lost and the associated superstabilizer system is engaged, the associated amber SYS FAIL warning light illuminates if the IAS is lower than 270 Knots.

D. Internal Tests

These are intended to test the system periodically.

The three autostabilizer axes are tested separately through an automatic test system. These tests are effected by the ITEM.
These tests can be performed only on the ground with the aircraft supported by its landing gear.

Using sequential binary logic signals controlled from the test equipemnt, the coding and decoding circuits allow isolation of inputs to the computers, and also enable control orders to be applied to the computation channels and monitoring units and read the response of these circuits to control orders.

(1) Points tested by the test sequence

<u>NOTE</u> : The autostabilization axis sub-systems must be engaged before starting the test sequence, and the TEST selector switch of the ADC corresponding to the lane to be tested must be placed in position 2 (selects IAS greater than 270 Kts). This enables the pitch and yaw axis sub-systems to be tested (The engage switches of these subsystems fall to the OFF position in the initial stage of the test sequence).

- Engage switches.
- Comparator thresholds.
- Equality of control and monitoring gains.
- Equality of control and monitoring limits.
- Spinner speed detectors.
- 26 V 400 Hz loss detectors.
- ± 15 V power supplies.
- Rate-gyro and accelerometer gradients.
- Gradient detector threshold (self-test circuit).

(2) Test of open lanes and adapters

This test is carried out using the flight control test set.

This consists of applying a voltage slope at the output of the autostabilization channels in order to check that the associated control surfaces deflect and that the elevon comparators do not switch in the electrical piloting mode.

(3) Test of circuits of gains and limits which are a function of Mach.

This test consists in applying a voltage slope at the input of the the autostabilization channels (rate-gyro demodulator output) and measuring control surface deflection for various Mach numbers. The test is carried out with the ADC's connected for checking the Mach potentiometers.

In flight (IFM mode), the binary control signals are normally grounded. When the ITEM is operational, it receives signals from engage switches and interlocks. It indicates and memorizes any failure detected in flight; this failure can be recalled on the ground.

9. Power Supply

The autostabilization system computers are directly supplied with 115VAC, lane 1 being supplied from an essential busbar and lane 2 from an avionics sheddable busbar.
The 26 VAC supply originates from an essential sheddable busbar for lane 1 and from a main busbar for lane 2. This 26 VAC supply is not directly fed to the computers. For lane 1 it first goes through the accelerometer (1C36) and the pitch and roll relay jack sensor synchro-detectors (C3 and C4). For lane 2 this supply goes through accelerometer 2C36 and the pitch and roll relay jack sensor synchro-detectors (C3 and C4). The two pitch monitoring rate-gyros (1C38 and 2C38) are supplied directly with 26 VAC. These units must be correctly connected to enable auto-stabilization system engagement.

SERVICE	BUSBAR	C/B PANEL
AUTOSTAB 1 COMP SUP	No.2 ESSENTIAL 6X	2-213
LAT ACCELMTR 1 26V SUP	A ESSENTIAL 14X	2-213
AUTOSTAB 2 COMP SUP	B AVIONICS SHEDDABLE 11X	13-216
LAT ACCELMTR 2 26V SUP	B MAIN 13X	13-216

AUTOSTABILIZATION - TROUBLE SHOOTING

WARNING : OBSERVE THE ELECTRICAL SAFETY PRECAUTIONS DESCRIBED IN 24-00-00, SERVICING.

OBSERVE THE HYDRAULIC SAFETY PRECAUTIONS DESCRIBED IN 22-22-00, ADJUSTMENT/TEST.

1. General

The following trouble shooting procedures are intended to enable faults found in autostabilizer system to be quickly rectifed.

The autostabilizer system comprises two identical sub-systems or channels, the function of which is on the one hand to generate autostabilization signals, on the other hand to transmit these signals via the open lanes.

Therefore, the autostabilizer system trouble shooting is divided into two paragraphs.

The first paragraph (paragraph 3) deals with trouble shooting concerning the generation of autostabilization signals. The procedure is described for channel 1 only and procedure for channel 2 is given in parentheses.

The second paragraph (paragraph 4) deals with trouble shooting procedure concerning transmission of autostabilization signals to the flight control amplifiers via the open lanes. Each channel is dealt with separately.

The defect can be isolated with the aid of trouble shooting procedures by checking the system power supplies, then by cheking the faulty channel computer and detectors (rate-gyros, accelerometer) by means of the ITEM system (Ref. 22-22-00, Adjustment/Test, Operational Test, paragraphs 2.C (1), 2.C (2), and 2.C (3) then tracing it through IF OK and IF NOT OK paths. If a defect occurs, follow the NOT OK path and perform the specified rectification action or refer to the appropriate chart. Then, repeat the operation at which the defect was encountered to ensure that the operation is OK.

Bracketed numbers in the procedures and charts indicate items on the Component Identification Table (Ref. Table 101). The table provides information, including component location required for rectification.

All procedures dealing with trouble shooting are based on the assumption that electrical wiring is serviceable, and that electrical power is available. If the fault is not rectified, check

the wiring in accordance with the Wiring Diagram Manual (Ref. Table 101).

2. Prepare

NOTE : Trouble shooting shall be carried out with the aircraft on the ground, shock absorbers compressed.

A. Make certain that control surface deflection area is clear.

B. Make certain that circuit breakers (Ref. Table 101) of auto-stabilizer system are set.

C. Energize the aircraft electrical network and connect electrical ground power unit (Ref. 24-41-00, Servicing).

D. Check that electronics rack ventilation operates.

E. On centre console, on ADC control panel, place ADC 1 switch in ON position in order to operate ADC 1 (Ref. 34-11-00, Adjustment/Test, Operational Test).

F. Make certain that flight controls can be set in Blue or Green electrical mode (Ref. 27-00-00, Servicing).

G. Make certain that Blue hydraulic system (Ref. 29-12-00, Servicing) and Green hydraulic system (Ref. 29-11-00, Servicing) may be pressurized.

H. Set the three trim controls to 0 degree.

3. Autostabilizer Trouble Shooting

```
**************************************************
* Prepare system for trouble shooting as described *
* in para.2. On ADC control panel, make certain that*
* TEST selector switches are in NORM position.      *
* Place ADC1 (ADC2) switch in ON position,then, if  *
* ADC1 (ADC2) amber caption light is illuminated,   *
* press to reset. On ceiling panel, make certain    *
* that ANTISTALL SYSTEM 1 and 2 switches are in OFF *
* position, then engage AUTOSTAB No.1 (No.2) YAW and*
* PITCH levers. Check that at least one of the two  *
* switches remains engaged. IF                      *
**************************************************
    ||   |
    OK   |-NOT OK-| Not possible to engage AUTOSTAB No.1 (No.2)
    ||            | PITCH and YAW levers.
    ||            | Ref. Chart 101
    ||
**************************************************
* By means of ITEM system on TEST UNIT, check       *
* AUTOSTAB No.1 (No.2) YAW axis.                    *
* Display data. IF                                  *
**************************************************
  AS||PASS  AS|COMP  AS|GYRO  AS|ACCL
                                 |
                                 | Remove lateral accelerometer
                        NOT OK--| No.1 [1] (No.2 [2]).

    OK            NOT OK-----------| Remove yaw rate-gyro
    ||                             | No.1 [3] (No.2 [4]).

    ||       NOT OK-------------------| Remove autostabilization
    ||                                | computer No.1 [5] (No.2 [6])
    ||
```

```
    ||
    OK
    ||
****************************************************
* By means of ITEM system on TEST UNIT, check      *
* AUTOSTAB No.1 (No.2) PITCH axis.                 *
* Display data. IF                                 *
****************************************************
    ||      |         |        |
  AS||PASS AS|COMP   AS|GYRO  AS|GYR.M
    ||      |         |        |
    ||      |         |        |    -------------------------------
    ||      |         |    NOT OK--| Remove monitoring pitch rate|
    ||      |         |            | gyro No.1 [7] (No.2 [3]).   |
    ||      |         |             -------------------------------
    ||      |         |             -------------------------------
    OK      |     NOT OK-----------| Remove control pitch rate   |
    ||      |                      | gyro No.1 [9] (No.2 [10]).  |
    ||      |                       -------------------------------
    ||      |                       -------------------------------
    ||  NOT OK---------------------| Remove autostabilization    |
    ||                             | computer No.1 [5] (No.2 [6])|
    ||                              -------------------------------
****************************************************
* By means of ITEM system on TEST UNIT, check      *
* AUTOSTAB No.1 (No.2) ROLL axis.                  *
* Display data. IF                                 *
****************************************************
  AS||PASS     AS|COMP      AS|GYRO
    ||           |            |     -------------------------------
    ||           |        NOT OK---| Remove roll rate gyro No.1  |
    ||           |                 | [11] (No.2 [12])            |
    ||           |                  -------------------------------
    ||           |                  -------------------------------
    ||       NOT OK----------------| Remove autostabilization    |
    ||                             | computer No.1 [5] (No.2 [6])|
    ||                              -------------------------------
    ||
    OK
    ||
    ||
```

```
    ||
***************************************************
* By means of ITEM system on TEST UNIT, check     *
* Safety Flight Control computer No.1 (No.2)      *
* Display data. IF                                *
***************************************************
 SFC||PASS    SFC|COMP         --------------------------------------
    ||           |             | Replace Safety Flight Control      |
    OK        NOT OK-----------| computer No.1 [13] (No.2 [14])     |
    ||                         --------------------------------------
    ||
    ||
***************************************************
* Make certain that control surface deflection area *
* is clear. Pressurize Blue and Green hydraulic     *
* systems. On ceiling panel, place flight controls  *
* in GREEN (BLUE) mode, then reset. Engage AUTOSTAB *
* No.1 (No.2) three levers PITCH, ROLL, and YAW.    *
* Check that the three levers remain engaged. IF    *
***************************************************
    ||           |           --------------------------------------
    ||           |           | Not possible to engage AUTOSTAB    |
    ||           |           | No.1 (No.2) ROLL and YAW axes.     |
    OK        NOT OK---------| Remove autostabilization computer  |
    ||           |           | No.1 [5] (No.2 [6]).               |
    ||           |           --------------------------------------
    ||           |
    ||           |           --------------------------------------
    ||           |           | Not possible to engage AUTOSTAB    |
    ||        NOT OK         | No.1 (No.2) PITCH and ROLL axes.   |
    ||           |           | Ref. Chart 102.                    |
    ||           |           --------------------------------------
    ||           |
    ||           |           --------------------------------------
    ||           |           | Not possible to engage AUTOSTAB    |
    ||        NOT OK---------| No.1 (No.2) YAW axis.              |
    ||           |           | Ref. Chart 103.                    |
    ||           |           --------------------------------------
    ||           |
    ||           |           --------------------------------------
    ||           |           | Not possible to engage AUTOSTAB    |
    ||        NOT OK---------| No.1 (No.2) ROLL axis.             |
    ||           |           | Ref. Chart 104.                    |
    ||           |           --------------------------------------
    ||           |
    ||           |
```

```
      ||          |
      ||          |          -------------------------------------
      OK      NOT OK----------| Not possible to engage AUTOSTAB    |
      ||                      | No.1 [No.2] PITCH axis.            |
      ||                      | Ref. Chart 105.                    |
      ||                      -------------------------------------
*****************************************************
* Disengage AUTOSTAB No.1 (No.2) ROLL and YAW levers*
* On ceiling panel, place ANTISTALL SYSTEM 1 (ANTI  *
* STALL SYSTEM 2) in ON position. Check that        *
* associated PITCH lever remains engaged. IF        *
*****************************************************
     ||   |
     ||   |   ---------------------------------------------------
     ||   |   | AUTOSTAB No.1 (No.2) PITCH lever disengagement  |
     OK  NOT OK----| on engagement of associated superstabilizer |
     ||       | Ref. Chart 106.                                  |
     ||       ---------------------------------------------------
     ||
*****************************************************
* Disengage AUTOSTAB No.1 (No.2) PITCH lever.       *
* On circuit breaker panel 13-215 (13-216), trip    *
* circuit breaker 1C653 (2C653), map ref. F6 (C16). *
* On ADC control panel place ADC1 (ADC2) TEST       *
* selector switch in position 2. Wait one minute    *
* approximately, then press ADC1 (ADC2) amber       *
* caption light to reset. Captain's (First          *
* Officer's) airspeed indicator displays 555 Kts    *
* approximately. Engage AUTOSTAB No.1 (No.2) PITCH  *
* lever. Check that lever remains engaged. IF       *
*****************************************************
     ||   |
     ||   |   ---------------------------------------------------
     ||   |   | Not possible to engage AUTOSTAB No.1 (No.2)     |
     ||   |   | PITCH axis when IAS greater than 270 Kts.       |
     OK  NOT OK----| Ref. Chart 107.                             |
     ||       ---------------------------------------------------
     ||
```

```
    ||
    OK
    ||
*****************************************************
* Place ANTISTALL SYSTEM 1 (ANTISTALL SYSTEM 2)     *
* in OFF position. On ADC control panel, press and  *
* hold ADC1 (ADC2) amber caption light, then place  *
* associated TEST selector switch in NORM position. *
* Approximately one minute later, release caption   *
* light. Captain's (First Officer's) airspeed       *
* indicator displays 40 Kts approximately. Place    *
* ANTISTALL SYSTEM 1 (ANTISTALL SYSTEM 2) in ON     *
* position. Check that PITCH lever returns to OFF   *
* position. IF                                      *
*****************************************************
    ||  |
    ||  |        --------------------------------------------------
    ||  |       | No disengagement of AUTOSTAB No.1 (No.2) PITCH |
    OK  NOT OK----| lever on loss of SFC 26 VAC power supply with  |
    ||          | associated superstabilizer engaged.            |
    ||          | Ref. Chart 108.                                |
    ||           --------------------------------------------------
    ||
*****************************************************
* Place ANTISTALL SYSTEM 1 (ANTISTALL SYSTEM 2) in  *
* OFF position. On circuit breaker panel 13-215     *
* (13-216) set circuit breaker 1C-653 (2C-653),     *
* map ref. F6 (C16). On ADC control panel, place    *
* ADC1 (ADC2) TEST selector switch in position 2.   *
* Wait one minute approximately, then press ADC1    *
* (ADC2) amber caption light to reset.              *
* Engage AUTOSTAB No.1 (No.2) three levers PITCH,   *
* ROLL and YAW.                                     *
* Operate Captain's control column handwheel to     *
* right then to left until ICOVOL indicator         *
* displays a ± 20 degrees outer and middle elevons  *
* deflection.                                       *
* Check that YAW lever remains engaged. IF          *
*****************************************************
    ||  |
    ||  |        --------------------------------------------------
    ||  |       | Disengagement of AUTOSTAB No.1 (No.2) YAW lever|
    OK  NOT OK----| in turns when IAS greater than 270 Kts.        |
    ||          | Ref. Chart 109.                                |
    ||           --------------------------------------------------
    ||
    ||
    ||
```

```
    ||
    ||
*****************************************************
* On ADC control panel, press then hold ADC1 (ADC2) *
* amber caption light, then place associated TEST   *
* selector switch in NORM position. Wait one minute *
* approximately then release associated caption     *
* light. Operate Captain's control column handwheel *
* as indicated above.                               *
* Check that YAW lever remains engaged. IF          *
*****************************************************
    ||   |
    ||   |    --------------------------------------------------
    ||   |    | Disengagement of AUTOSTAB No.1 (No.2) YAW lever|
    OK  NOT OK----| in turns, when IAS lower than 270 Kts.     |
    ||        | Ref. Chart 110.                                |
    ||        --------------------------------------------------
    ||
*****************************************************
* Disengage AUTOSTAB No.1 (No.2) PITCH lever.       *
* Check that on master warning panel STAB red       *
* warning light illuminates and that gong sounds. IF*
*****************************************************
    ||   |
    ||   |    --------------------------------------------------
    ||   |    | On master warning panel, no STAB warning light |
    OK  NOT OK----| on total loss of PITCH autostabilizer.     |
    ||        | Ref. Chart 111.                                |
    ||        --------------------------------------------------
    ||
*****************************************************
* Press STAB warning light to cancel warning,       *
* disengage AUTOSTAB No.1 (No.2) ROLL lever.        *
* Check that, on master warning panel, STAB red     *
* warning light illuminates and gong sounds. IF     *
*****************************************************
    ||   |
    ||   |    --------------------------------------------------
    ||   |    | On master warning panel, no STAB warning light |
    OK  NOT OK----| on total loss of ROLL autostabilizer.      |
    ||        | Ref. Chart 111.                                |
    ||        --------------------------------------------------
    ||
    ||
    ||
    ||
    ||
    ||
    ||
```

```
    ||
    ||
*****************************************************
* Press STAB warning light to cancel warning,       *
* disengage AUTOSTAB No.1 (No.2) YAW lever.         *
* On master warning panel, check that STAB red      *
* warning light illuminates and that gong sounds. IF*
*****************************************************
    ||   |
    ||   |       ------------------------------------------------------
    OK   NOT OK----| On master warning panel, no STAB warning on      |
    ||             | total loss of YAW autostabilizer                  |
    ||             | Ref. Chart 111.                                   |
    ||             ------------------------------------------------------
    ||
*****************************************************
* Place ANTISTALL SYSTEM 1 (ANTISTALL SYSTEM 2)     *
* switch in ON position. Engage AUTOSTAB No.1 (No.2)*
* PITCH and ROLL levers. On Captain's control column*
* press then hold emergency flight control test     *
* button. Check that PITCH and ROLL levers remain   *
* engaged. IF                                       *
*****************************************************
    ||   |
    ||   |       ------------------------------------------------------
    OK   |         | Disengagement of AUTOSTAB No.1 (No.2) PITCH and|
    ||   NOT OK----| ROLL levers on engagement of emergency flight   |
    ||             | control.                                        |
    ||             | Ref. Chart 112.                                 |
    ||             ------------------------------------------------------
    ||
*****************************************************
* Keep holding emergency flight control test button,*
* operate control column handwheel while operating  *
* control column in nose up or nose down direction. *
* Check that PITCH lever remains engaged. IF        *
*****************************************************
    ||   |
    ||   |       ------------------------------------------------------
    ||   |         | Disengagement of AUTOSTAB No.1 (No.2) PITCH     |
    OK   NOT OK----| lever with emergency flight control engaged and|
    ||             | roll and pitch flight control operation.         |
    ||             | Ref. Chart 113.                                  |
    ||             ------------------------------------------------------
    ||
    ||
    ||
```

```
    ||
    ||
    OK
    ||
**************************************************
* On shelf 8-215 (8-216), check that, on monitoring *
* comparator 1C48 (2C48), FAILURE DETECTION warning *
* lights remain extinguished. IF                    *
**************************************************
    ||   |
    ||   |         -------------------------------------------------
    OK   NOT OK----| Ref. paragraph 4 of open lanes trouble shooting|
    ||             -------------------------------------------------
    ||
**************************************************
* If fault remains in actual or simulated flight    *
* configuration only, proceed as per chart 111, NOT *
* OK line, checking of Mach or incidence signals    *
* from ADC. IF                                      *
**************************************************
    ||   |
    ||   |         -------------------------------------------------
    OK   NOT OK----| Ref. Chart 114.                                |
    ||             -------------------------------------------------
    ||
**************************************************
* Autostabilizer No.2 is operative. IF              *
**************************************************
    ||   |
    ||   |         -------------------------------------------------
    OK   NOT OK----| Repeat AS No.1 trouble shooting procedure,     |
    ||             | using information given in parentheses.        |
    ||             -------------------------------------------------
    ||
**************************************************
* Disengage two levers PITCH and ROLL.              *
* Bring relevant systems back to initial condition. *
* Autostabilizer system is operational.             *
**************************************************
```

4. Open Lanes Trouble Shooting

```
****************************************************
* Place ANTISTALL SYSTEM 1 switch in ON position.   *
* Operate AUTOSTAB No.1 PITCH, ROLL and YAW levers. *
* Operate pilot's control column in nose up or nose *
* down direction to obtain approximately 6 degrees  *
* elevon deflection on ICOVOL indicator.            *
* Press emergency flight control test button.       *
* Check on ICOVOL indicator that elevon nose up or  *
* nose down deflection increases. IF                *
****************************************************
    ||   |
    ||   |         ---------------------------------------------------
    OK   NOT OK----| No deflection of inner elevons.                  |
    ||   |         | Replace autostabilization computer No.1 [5].     |
    ||   |         ---------------------------------------------------
    ||   |
    ||   |         ---------------------------------------------------
    ||   NOT OK----| No deflection of outer and middle elevons.       |
    ||             | Replace autostabilization computer No.1 [5].     |
    ||             ---------------------------------------------------
    ||
****************************************************
* On shelf 8-215, check on monitoring comparator    *
* 1C48 that FAILURE DETECTION warning lights remain *
* extinguished. IF                                  *
****************************************************
    ||   |
    ||   |         ---------------------------------------------------
    OK   NOT OK----| Failure of comparison function.                  |
    ||             | Ref. Chart 115.                                  |
    ||             ---------------------------------------------------
    ||
    ||
```


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```
    ||
*****************************************************
* Release emergency flight TEST button.             *
* Bring control column back to neutral position.    *
* Operate handwheel to right or left to display     *
* an outer and middle elevon deflection of 10       *
* degrees approximately associated with rudder      *
* deflection on ICOVOL indicator.                   *
* Press emergency flight control test button.       *
* On ICOVOL check that outer and middle elevon roll *
* deflection increases. IF                          *
*****************************************************
    ||   |
    ||   |     ---------------------------------------------------
    OK   NOT OK----| No outer and middle elevon deflection.         |
    ||   |         | Replace autostabilization computer No.1 [5].   |
    ||   |     ---------------------------------------------------
    ||   |
    ||   |     ---------------------------------------------------
    ||   |         | No rudder deflection.                          |
    ||   NOT OK----| Replace autostabilization computer No.1 [5].   |
    ||         ---------------------------------------------------
    ||
*****************************************************
* On shelf 8-215, check that on monitoring          *
* comparator 1C48, FAILURE DETECTION warning lights *
* remain extinguished. IF                           *
*****************************************************
    ||   |
    ||   |     ---------------------------------------------------
    OK   NOT OK----| Failure of comparison function. Ref. Chart 115.|
    ||         ---------------------------------------------------
    ||
*****************************************************
* Release emergency flight control test button.     *
* Bring control column handwheel back to neutral    *
* position. Place flight controls in BLUE mode then *
* reset. Move pilot control column in nose up or    *
* nose down direction for a deflection of 6 degrees *
* approximately on ICOVOL indicator.                *
* Press emergency flight control test button.       *
* Check on ICOVOL that elevon nose up or nose down  *
* deflection increases. IF                          *
*****************************************************
    ||   |
    ||   |
    ||   |
```

```
    ||   |        -------------------------------------------------
    OK   NOT OK----| No inner elevon deflection. Ref. Chart 115.    |
    ||   |        -------------------------------------------------
    ||   |
    ||   |        -------------------------------------------------
    ||   |        | No outer and middle elevon deflection.          |
    ||   NOT OK----| Ref. Chart 115.                                |
    ||            -------------------------------------------------
    ||
*****************************************************
* On shelf 8-215, check on monitoring comparator    *
* 1C48 that FAILURE DETECTION warning lights remain *
* extinguished. IF                                  *
*****************************************************
    ||   |
    ||   |        -------------------------------------------------
    OK   NOT OK----| Failure of comparison. Ref. Chart 115.         |
    ||            -------------------------------------------------
    ||
*****************************************************
* Release emergency flight control test button.     *
* Bring control column back to neutral position.    *
* Move control column handwheel to the right or to  *
* the left in order to obtain an outer and middle   *
* elevon deflection of 10 degrees approximately on  *
* ICOVOL, associated with rudder deflection.        *
* Press emergency flight control test button.       *
* On ICOVOL, check that outer and middle elevon     *
* roll deflection increases. IF                     *
*****************************************************
    ||   |
    ||   |        -------------------------------------------------
    OK   NOT OK----| No outer and middle elevon deflection.         |
    ||   |        | Ref. Chart 115.                                 |
    ||   |        -------------------------------------------------
    ||   |
    ||   |        -------------------------------------------------
    ||   NOT OK----| No rudder deflection.                          |
    ||            | Ref. Chart 115.                                 |
    ||            -------------------------------------------------
    ||
    ||
```

```
*****************************************************
* On shelf 8-215 check on monitoring comparator     *
* 1C48 that FAILURE DETECTION warning lights remain *
* extinguished. IF                                  *
*****************************************************
     ||   |
     ||   |        ---------------------------------------------------
     OK   NOT OK----| Failure of comparison function. Ref. Chart 115.|
     ||            ---------------------------------------------------
     ||
*****************************************************
* On ADC control panel, place ADC2 switch in ON     *
* position, then press amber ADC2 warning light     *
* to reset, if illuminated.                         *
* Disengage AUTOSTAB No.1 PITCH, ROLL and YAW levers*
* Place ANTISTALL SYSTEM 1 switch in OFF position   *
* and ANTISTALL SYSTEM 2 switch in ON position.     *
* Engage AUTOSTAB No.2 PITCH, ROLL and YAW levers.  *
* Operate pilot control column in order to display  *
* a 6 degrees deflection on the ICOVOL.             *
* Press emergency flight control test button. On    *
* ICOVOL, check that elevon deflection increases. IF*
*****************************************************
     ||   |
     ||   |        ---------------------------------------------------
     ||   |        | No inner elevon deflection.                     |
     OK   NOT OK----| Replace autostabilization computer No.2 [6].   |
     ||   |        ---------------------------------------------------
     ||   |
     ||   |        ---------------------------------------------------
     ||   |        | No outer and middle elevon deflection.          |
     ||   NOT OK----| Remove autostabilization computer No.2 [6].    |
     ||            ---------------------------------------------------
     ||
*****************************************************
* On shelf 8-216,check on monitoring comparator 2C48*
* that FAILURE DETECTION warning lights remain      *
* illuminated. IF                                   *
*****************************************************
     ||   |
     ||   |        ---------------------------------------------------
     OK   NOT OK----| Failure of comparison function. Ref. Chart 115.|
                   ---------------------------------------------------
```

```
     ||
     ||
     ||
*****************************************************
* Release emergency flight control test button      *
* Bring control column back to neutral position.    *
* Operate control column handwheel to right or to   *
* left to obtain outer and middle elevons deflection*
* of 10 degrees approximately on ICOVOL indicator,  *
* associated with rudders deflection.               *
* Press emergency flight control test button.       *
* On ICOVOL, check that roll deflection of outer    *
* and middle elevons increases. IF                  *
*****************************************************
     ||   |
     ||   |      --------------------------------------------------
     ||   |     | No deflection of outer and middle elevons.       |
     OK   NOT OK----| Replace autostabilization computer No.2 [6].  |
     ||   |      --------------------------------------------------
     ||   |
     ||   |      --------------------------------------------------
     ||   |     | No deflection of rudders.                        |
     ||   NOT OK----| Replace autostabilization computer No.2 [6].  |
     ||          --------------------------------------------------
     ||
*****************************************************
* On shelf 8-216, check on monitoring comparator    *
* 2C48 that FAILURE DETECTION warning lights remain *
* extinguished. IF                                  *
*****************************************************
     ||   |
     ||   |      --------------------------------------------------
     OK   NOT OK----| Failure of comparison function.               |
     ||         | Ref. Chart 115.                                  |
     ||          --------------------------------------------------
     ||
     ||
```

```
     ||
     ||
     ||
*****************************************************
* Release emergency flight control test button.     *
* Bring control column handwheel to neutral position*
* Operate flight controls in GREEN mode.            *
* Operate pilot control column to display           *
* a 6 degrees nose up or nose down deflection on    *
* ICOVOL indicator.                                 *
* Press emergency flight control test button.       *
* Check on ICOVOL indicator that nose up or nose    *
* down elevon deflection increases. IF              *
*****************************************************
     ||  |
     ||  |      --------------------------------------------------
     OK  NOT OK----| No inner elevon deflection.                   |
     ||  |         | Ref. Chart 115.                               |
     ||  |      --------------------------------------------------
     ||  |
     ||  |      --------------------------------------------------
     ||  NOT OK----| No outer and middle elevon deflection.        |
     ||            | Ref. Chart 115.                               |
     ||         --------------------------------------------------
     ||
*****************************************************
* On shelf 8-216, check on monitoring comparator    *
* 2C48 that FAILURE DETECTION warning lights remain *
* extinguished. IF                                  *
*****************************************************
     ||  |
     ||  |      --------------------------------------------------
     OK  NOT OK----| Failure of comparison function.               |
     ||            | Ref. Chart 115.                               |
     ||         --------------------------------------------------
     ||
     ||
     ||
```

```
****************************************************
* Release emergency flight control test button.    *
* Bring control column back to neutral position.   *
* Operate control column handwheel to right or to  *
* left to display on ICOVOL indicator on outer and *
* middle elevons deflection of 10 degrees          *
* approximately, associated with rudders deflection.*
* Push emergency flight control test button.       *
* Check on ICOVOL indicator that outer and middle  *
* elevons roll deflection increases. IF            *
****************************************************
    ||  |
    ||  |      --------------------------------------------------
    ||  |      | No deflection of outer and middle elevons.     |
    OK  NOT OK----| Ref. Chart 115.                             |
    ||  |      --------------------------------------------------
    ||  |
    ||  |      --------------------------------------------------
    ||  NOT OK----| No deflection of rudders                    |
               | Ref. Chart 115.                                |
               --------------------------------------------------

****************************************************
* On shelf 8-216, check on monitoring comparator   *
* 2C48 that FAILURE DETECTION warning lights remain *
* extinguished. IF                                 *
****************************************************
    ||  |
    ||  |      --------------------------------------------------
    ||  NOT OK----| Failure of comparison function.             |
    ||         | Ref. Chart 115.                                |
    ||         --------------------------------------------------
    ||
    ||
```

```
    ||
    ||
    OK
    ||
    ||
*****************************************************
* Release emergency flight control test button.     *
* Bring control column handwheel back to neutral    *
* position.                                         *
* Engage flight controls in BLUE mode, then reset.  *
* Place two switches ANTISTALL SYSTEM 1 and 2 in ON *
* position. Engage AUTOSTAB No.1 three levers PITCH,*
* ROLL and YAW.                                     *
* Operate control column to obtain a nose up or     *
* nose down deflection of 6 degrees approximately   *
* on ICOVOL indicator.                              *
* Press emergency flight control test button.       *
* Check on ICOVOL indicator that elevons deflection *
* increases. IF                                     *
*****************************************************
    ||   |
    ||   |          ----------------------------------------------
    OK   NOT OK----| No deflection of inner elevons.              |
    ||   |         | Ref. Chart 115.                              |
    ||   |          ----------------------------------------------
    ||   |
    ||   |          ----------------------------------------------
    ||   NOT OK----| No deflection of outer and middle elevons.   |
    ||             | Ref. Chart 115.                              |
    ||              ----------------------------------------------
    ||
*****************************************************
* On shelves 8-215, 8-216, check on monitoring      *
* comparators 1C48 and 2C48 that FAILURE DETECTION  *
* warning lights remain extinguished. IF            *
*****************************************************
    ||   |
    ||   |          ----------------------------------------------
    OK   NOT OK----| Failure of comparison function.              |
    ||             | Ref. Chart 115.                              |
    ||              ----------------------------------------------
    ||
    ||
    ||
    ||
    ||
    ||
    ||
```

```
    ||
    ||
*****************************************************
* Release emergency flight control test button.     *
* Bring control column back to neutral position.    *
* Operate control column handwheel to right or left *
* to display an outer and middle elevon deflection  *
* of 10 degrees approximately on ICOVOL indicator,  *
* associated with rudders deflection.               *
* Press emergency flight control test button.       *
* Check on ICOVOL indicator that outer and middle   *
* elevons roll deflection increases. IF             *
*****************************************************
    ||   |
    ||   |     --------------------------------------------------
    OK   NOT OK----| No deflection of outer and middle elevons.  |
    ||   |         | Ref. Chart 115.                             |
    ||   |     --------------------------------------------------
    ||   |
    ||   |     --------------------------------------------------
    ||   |         | No deflection of rudders.                   |
    ||   |         | Ref. Chart 115.                             |
    ||   |     --------------------------------------------------
    ||   |
*****************************************************
* On shelves 8-215, 8-216, check on monitoring      *
* comparators 1C48 and 2C48 that FAILURE DETECTION  *
* warning lights remain extinguished. IF            *
*****************************************************
    ||   |
    ||   |     --------------------------------------------------
    OK   NOT OK----| Failure of comparison function.             |
    ||             | Ref. Chart 115.                             |
    ||         --------------------------------------------------
    ||
*****************************************************
* The open lanes are operational.                   *
*****************************************************
```

```
***************************************-------------------------------
* NOT POSSIBLE TO ENGAGE AUTOSTAB No1*| GROUND EQUIPMENT REQUIRED   |
* (No2) PITCH OR YAW AXIS.           *|-----------------------------|
**************************************| DESCRIPTION        PART NO. |
                                      |-----------------------------|
                                      | MULTIMETER                  |
                                      -------------------------------

****************************************
* Operate AUTOSTAB No1 (No2) ROLL lever*
* Check that lever remains engaged. IF *
****************************************
     |     |
     |     |     ----------------------------------------------------
    YES    NO-----| Replace associated autostabilization computer. |
     |           | On shelf connector 1C31 AB (2C31 AB), check     |
     |           | that 115 VAC is supplied between terminals 93   |
     |           | and 106 (neutral)                               |
     |           ----------------------------------------------------
     |                     |                            |
     |                    YES                           NO
     |                     |                            |
     |           ---------------------------   ---------------------
     |           | Replace autostabilization | | Replace circuit   |
     |           | computer No1 [5] (No2 [6])| | breaker[15]([16]) |
     |           ---------------------------   ---------------------
     |
*******************************************************
* Replace relevant autostabilization computer.        *
* On shelf connector 1C31 AB (2C31 AB), check that    *
* 26 VAC is supplied betxeen terminals 94 and 80      *
* (neutral).                                          *
*******************************************************
     |     |
     |     |     ----------------------------------------------------
    YES    NO-----| Check 26 VAC supply from circuit breaker [17]  |
     |           | ([18]) through lateral accelerometer No1 [1]    |
     |           | (No2 [2]) to pitch [19] and roll [20] relay     |
     |           | jack sensors                                    |
     |           ----------------------------------------------------
     |
     |           ----------------------------------------------------
     |           | Replace autostabilization computer No1 [5]      |
     ------------| (No2 [6]).                                      |
                 ----------------------------------------------------
```

Chart 101

```
*************************************
* NOT POSSIBLE TO ENGAGE AUTOSTAB No1*
* (No2) PITCH AND ROLL AXIS         *
*************************************

****************************************************
* For test purposes, replace autostabilization     *
* computer No1 [5] (No2 [6]).                      *
* Operate AUTOSTAB No1 (No2) PITCH and ROLL levers  *
* Check that these two levers remain engaged. IF   *
****************************************************
        |                 |
        |                 |           ---------------------------
        |                 |           | Replace Safety Flight    |
       YES                NO----------| Control computer No1 [13] |
        |                             | (No2 [14])               |
        |                             ---------------------------
        |
        |                             ---------------------------
        ------------------------------| Replace removed computer |
                                      | by the new one.          |
                                      ---------------------------
```

Chart 102

```
*************************************-------------------------------
* NOT POSSIBLE TO ENGAGE AUTOSTAB No1*| GROUND EQUIPMENT REQUIRED    |
* (No2) YAW AXIS                     *|------------------------------|
**************************************| DESCRIPTION        PART NO.  |
                                      |------------------------------|
                                      | MULTIMETER                   |
                                      --------------------------------


****************************************************
* For test purposes, replace autostabilization     *
* computer No1 [5] (No2 [6])                       *
* Operate AUTOSTAB No1 (No2) YAW lever.            *
* Check that lever remains engaged. IF             *
****************************************************
        |    |
        |    |
        |    |    ----------------------------------------
        NO   YES---| Replace removed computer by the new one. |
        |         ----------------------------------------
        |
************************************************
* On front face of relevant autostabilization  *
* computer, on ZA test socket, measure voltage *
* between terminals 3 and 39 (ground).         *
* Measured voltage is :                        *
************************************************
        |    |
        |    |
        |    |    ----------------------------------------
   -3,25V    +10V--| Replace roll relay jack sensor [20]      |
        |         ----------------------------------------
        |
        |
        |         ----------------------------------------
        ----------| Replace AUTOSTAB No1 [21] (No2 [22]) control |
                  | unit.                                    |
                  ----------------------------------------
```

Chart 103

```
***************************************
* NOT POSSIBLE TO ENGAGE AUTOSTAB No1*
* (No2) ROLL AXIS.                   *
***************************************


*******************************************************
* For test purposes, replace AUTOSTAB No1 [5] (No2 [6]*
* Operate AUTOSTAB No1 (No2) ROLL lever. Check that   *
* lever remains engaged. IF                           *
*******************************************************
        |         |
        |         |
        |         |
        NO        |  ----------------------------------------------
        |         YES---| Replace removed computer by the new one.  |
        |            ----------------------------------------------
        |
        |            ----------------------------------------------
        ----------------| Replace AUTOSTAB No1 [21] (No2 [22]).    |
                        | control unit.                            |
                     ----------------------------------------------
```

Chart 104

```
************************************
* NOT POSSIBLE TO ENGAGE AUTOSTAB No1*
* (No2) PITCH AXIS.                 *
************************************

***************************************************
* For test purposes, replace AUTOSTAB No1 [5] (No2  *
* [6]).                                           *
* Engage AUTOSTAB No1 (No2) PITCH lever.           *
* Check that lever remains engaged. IF            *
***************************************************
    |        |
    |        |   ----------------------------------------------
    NO       YES---| Replace removed computer by the new one.     |
    |              ----------------------------------------------
***************************************************
* On ADC control panel, place ADC1 (ADC2) TEST      *
* selector switch in position 2.                  *
* One minute later approximately, press associated  *
* amber caption light to reset. Engage AUTOSTAB No1 *
* (No2) PITCH lever. Check that lever remains       *
* engaged. IF                                     *
***************************************************
    |        |
    |        |   ----------------------------------------------
   YES       NO---| Replace AUTOSTAB No1 [21] (No2 [22]) control  |
    |             | unit.                                        |
    |              ----------------------------------------------
    |
***************************************************
* Disengage AUTOSTAB No1 (No2) PITCH lever. Place   *
* ADC1 (ADC2) TEST selector switch in NORM position.*
* One minute later approximately, reset. For test   *
* purposes, replace autostabilization computer [6]  *
* ([5]) of opposite side. Operate AUTOSTAB No1 (No2)*
* PITCH lever. Check that lever remains engaged. IF *
***************************************************
    |        |
    |        |   ----------------------------------------------
    NO       YES---| Replace removed autostabilization computer of |
    |              | opposite side by the new one.                |
    |              ----------------------------------------------
    |
    |              ----------------------------------------------
    -------------| Replace flight control unit [23].            |
                   ----------------------------------------------
```

Chart 105

```
*************************************
* DISENGAGEMENT OF AUTOSTAB No1 (No2)*
* PITCH LEVER ON ENGAGEMENT OF       *
* ASSOCIATED SUPERSTABILIZER.        *
*************************************

***************************************************
* For test purposes, replace autostabilization    *
* computer No1 [5] (No2 [6]).                     *
* Engage AUTOSTAB No1 (No2) PITCH lever.          *
* Place ANTISTALL SYSTEM 1 (2) switch in ON position*
* Check that PITCH lever remains engaged. IF      *
***************************************************
        |    |
        |    |
        |    |    ---------------------------------------------
        NO   YES---| Replace removed computer by the new one.  |
        |         ---------------------------------------------
        |
        |         ---------------------------------------------
        ----------| Refer to Safety Flight Control system trouble |
                  | shooting (27-39-00)                          |
                  ---------------------------------------------
```

Chart 106

```
*************************************
* NOT POSSIBLE TO ENGAGE AUTOSTAB No1*
* (No2) PITCH AXIS WHEN IAS GREATER  *
* THAN 270 KTS                       *
*************************************

****************************************************
* On ADC control panel, place ADC1 (ADC2) switch   *
* in ON position. Place associated ADC TEST selector*
* switch in position 2.                            *
* Wait one minute approximately, then press ADC1   *
* (ADC2) amber caption light to reset.             *
* Operate AUTOSTAB No1 (No2) YAW lever.            *
* Check that lever remains engaged. IF             *
****************************************************
        |    |
        |    |
        |    |    -----------------------------------------------------
       NO   YES---| Replace autostabilization computer No1 [5]        |
        |         | (No2 [6])                                         |
        |         -----------------------------------------------------
        |
        |
****************************************************
* On shelf 6-215 (6-216), replace relay [24] ([25]) *
* Operate AUTOSTAB No1 (No2) PITCH lever.          *
* Check that lever remains engaged. IF             *
****************************************************
        |    |
        |    |
        |    |    -----------------------------------------------------
       NO   YES---| Replace removed relay by the new one.             |
        |         -----------------------------------------------------
        |
        |         -----------------------------------------------------
        ----------| Replace air data computer No1 [26] (No2 [27])     |
                  -----------------------------------------------------
```

Chart 107

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```
*************************************
* NO DISENGAGEMENT OF AUTOSTAB No1   *
* (No2) PITCH LEVER ON LOSS OF SFC   *
* 26 VAC POWER SUPPLY WITH ASSOCIATED*
* SUPERSTABILIZER ENGAGED.           *
*************************************

****************************************************
* For test purposes, replace autostabilization     *
* computer No1 [5] (No2 [6]).                      *
* Operate AUTOSTAB No1 (No2) PITCH lever.          *
* Place ANTISTALL SYSTEM 1 (2) switch in ON position*
* Check that PITCH lever returns to OFF. IF        *
****************************************************
        |    |
        |    |
        |    |      -----------------------------------------------
        NO   YES---| Replace removed computer by the new one.      |
        |           -----------------------------------------------
        |
        |           -----------------------------------------------
        ----------| Replace Safety Flight Control Computer No1    |
                   | [13] (No2 [14]).                              |
                    -----------------------------------------------
```

Chart 108

```
**************************************
* DISENGAGEMENT OF AUTOSTAB No1 (No2)*
* YAW LEVER IN TURNS WHEN IAS        *
* GREATER THAN 270 KTS               *
**************************************

*****************************************************
* For test purposes, replace autostabilization      *
* computer No1 [5] (No2 [6]). On ADC control panel, *
* place ADC1 (ADC2) in ON position. Place associated*
* TEST selector switch in position 2.               *
* Wait one minute approximately, then press ADC1    *
* (ADC2) amber caption light.                       *
* Operate AUTOSTAB No1 (No2) PITCH, ROLL and YAW    *
* levers. Operate roll handwheel to right then to   *
* left until stop is reached.                       *
* Check if YAW lever remains engaged. IF            *
*****************************************************
        |    |
        |    |
        |    |    --------------------------------------------------
        NO   YES---| Replace removed computer by the new one.       |
        |         --------------------------------------------------
        |
*****************************************************
* Bring roll handwheel back to neutral position.    *
* On ADC control panel, make certain that ADC2      *
* (ADC1) TEST selector switch is in NORM position,  *
* place ADC2 (ADC2) switch in ON position. Press    *
* ADC2 (ADC1) amber caption light to reset.         *
* On master warning panel, ADS red warning light    *
* illuminates, cancel ADS warning. Operate          *
* AUTOSTAB No1 (No2) YAW lever. Operate roll        *
* handwheel to right then to left until stop is     *
* reached. IF                                       *
*****************************************************
        |    |
        |    |    --------------------------------------------------
        NO   YES---| Replace air data computer No1 [26] (No2 [27])  |
        |         --------------------------------------------------
        |
        |
        |
        |         --------------------------------------------------
        ----------| Replace roll relay jack sensor [20]             |
                  --------------------------------------------------
```

Chart 109

```
***************************************
* DISENGAGEMENT OF AUTOSTAB No1 (No2)*
* YAW LEVER IN TURNS WHEN IAS LOWER  *
* THAN 270 KTS.                      *
***************************************

*****************************************************
* On circuit breaker panel 1-213, trip circuit      *
* breakers STICK SHAKER SUP W513, map ref P15, and  *
* LH UC WEIGHT SW A SYS SUP G292, map ref M17.      *
* On circuit breaker panel 3-213, trip circuit      *
* breaker RH UC WEIGHT SYS SUP G294, map ref B9.    *
* Check that circuit breakers used for wobbler      *
* operational test are set. Ref. 27-39-00,          *
* Adjustment/Test, paragraph 3. On ADC control panel*
* place ADC1 (ADC2) TEST selector switch in         *
* position 1.                                       *
* Wait 30 seconds approximately, then press ADC1    *
* (ADC2) amber caption light to reset.              *
* On ceiling panel, engage ARTIFICIAL FELL No1 (No2)*
* PITCH lever, place ANTISTALL SYSTEM 1 (2) switch  *
* in ON position. Slightly pull pilot's control     *
* Column. Check that a pulsed effort is felt. IF    *
*****************************************************
        |    |
        |    |
        |    |          ---------------------------------------------------
        NO   YES---| Replace autostabilization computer No1 [5]      |
        |          | (No2 [6]).                                      |
        |          ---------------------------------------------------
        |
        |          ---------------------------------------------------
        -----------| Replace air data computer No1 [26] (No2 [27])   |
                   ---------------------------------------------------
```

Chart 110

```
**************************************
* ON MASTER WARNING PANEL, NO STAB   *
* WARNING LIGHT ON TOTAL LOSS OF ONE *
* AUTOSTABILIZER AXIS.               *
**************************************


*****************************************************
* Operate AUTOSTAB No1 (No2) PITCH, ROLL and YAW    *
* levers. On ITEM control and indicator panel,      *
* respectively place IFM-OFF-TEST side 1 (side 2)   *
* and FLIGHT-TEST ALL-TEST UNIT in positions IFM    *
* and FLIGHT.                                       *
* Approximately one minute later, autotest is       *
* completed and ITEM indication is no longer        *
* indicated on side 1 (side 2) IFM quadrant lower   *
* indicator. On circuit breaker panel 2-213 (13-216)*
* trip circuit breaker 1C37 (2C37), map ref E5 (D17)*
* The three levers PITCH, ROLL and YAW return to    *
* OFF. On ITEM control and indicator panel, place   *
* side 1 (side 2) READ-CANCEL switch in READ        *
* position. Check that AS.P, AS.R and AS.Y appear   *
* in side 1 (side 2) IFM quadrant upper indicator.  *
* IF                                                *
*****************************************************
        |    |
        |    |    ---------------------------------------------------
       YES   NO---| Replace autostabilization computer No1 [5]      |
        |         | (No2 [6]) then place READ-CANCEL switch         |
        |         | in CANCEL position to erase indications from    |
        |         | store.                                          |
        |         ---------------------------------------------------
        |
        |         ---------------------------------------------------
        ----------| Refer to master warning system trouble shooting|
                  | (33-15-00)                                      |
                  ---------------------------------------------------
```

Chart 111

```
**************************************
* DISENGAGEMENT OF AUTOSTAB NO1 (No2)*
* PITCH AND ROLL LEVERS ON ENGAGEMENT*
* OF EMERGENCY FLIGHT CONTROL.       *
**************************************


*****************************************************
* For test purposes, replace autostabilization      *
* computer No1 [5] (No2 [6]).                       *
* Engage AUTOSTAB No1 (No2) PITCH and ROLL levers.  *
* Place ANTISTALL SYSTEM 1 (2) in ON position.      *
* Press emergency flight control test button.       *
* Check that both PITCH and ROLL levers remain      *
* engaged. IF                                       *
*****************************************************
        |    |
        |    |
        |    |
        |    |     ------------------------------------------------
        NO   YES---| Replace removed computer by the new one.     |
        |          ------------------------------------------------
        |
        |          ------------------------------------------------
        ----------| Refer to Safety Flight Control trouble shooting|
                   | (Ref. 27-39-00)                              |
                   ------------------------------------------------
```

Chart 112

```
**************************************
* DISENGAGEMENT OF AUTOSTAB No1 (No2)*
* PITCH LEVER WITH EMERGENCY FLIGHT  *
* CONTROL ENGAGED AND PITCH AND ROLL *
* FLIGHT CONTROL OPERATION.          *
**************************************


*****************************************************
* For test purposes, replace autostabilization      *
* computer No1 [5] (No2 [6]).                       *
* Engage AUTOSTAB No1 (No2) PITCH and ROLL levers   *
* Place ANTISTALL SYSTEM 1 (2) switch in ON position*
* Press and hold emergency flight control test      *
* button while operating pitch and roll flight      *
* controls. Check that PITCH lever remains engaged. *
* IF                                                *
*****************************************************
        |    |
        |    |
        |    |    --------------------------------------------------
        NO   YES---| Replace removed computer by the new one.       |
        |         --------------------------------------------------
        |
        |         --------------------------------------------------
        ----------| Refer to safety flight control trouble shooting|
                  | (Ref. 27-39-00).                               |
                  --------------------------------------------------
```

Chart 113

```
*************************************-----------------------------
* CHECK OF MACH AND INCIDENCE OUTPUTS*| GROUND EQUIPMENT REQUIRED  |
* FROM AIR DATA COMPUTER FOR GAIN    *|----------------------------|
* CHANGE.                            *| DESCRIPTION       PART NO. |
*************************************|----------------------------|
                                     | MULTIMETER                 |
                                     -----------------------------

*****************************************************
* On ADC control panel, place ADC1 (ADC2) TEST      *
* selector switch in position 2. Approximately one  *
* minute later, press ADC1 (ADC2) amber caption     *
* light to reset.                                   *
* Engage AUTOSTAB No1 (No2) PITCH, ROLL and YAW     *
* levers.                                           *
* On front face of associated autostabilization     *
* computer, on test plugs ZA and ZB, compare        *
* voltages measured between pins 42 and 39 of       *
* PLUG ZA and between pins 42 and 39 of plug ZB.    *
* Check that both voltages are identical. IF        *
*****************************************************
    |   |
    |   |        ---------------------------------------------------
   YES  NO--------| Replace air data computer No1 [26] (No2 [27]). |
    |            ---------------------------------------------------
    |
*****************************************************
* Compare voltages measured between pins 38 and 39  *
* (ground) of plug ZA and between pins 39 and 39    *
* (ground) of plug ZB. Check that both voltages are *
* identical. IF                                     *
*****************************************************
    |   |
    |   |        ---------------------------------------------------
   YES  NO--------| Replace air data computer No1 [26] (No2 [27]). |
    |            ---------------------------------------------------
    |
*****************************************************
* Compare voltages measured between pins 12 and 39  *
* (ground) of plug ZA and between pins 12 and 39    *
* (ground) of plug ZB. Check that both voltages are *
* identical. IF                                     *
*****************************************************
    |   |
    |   |        ---------------------------------------------------
   YES  NO--------| Replace air data computer No1 [26] (No2 [27]). |
    |            ---------------------------------------------------
```

Chart 114 (Sheet 1 Of 2)

```
    |
    |
    |
***************************************************
* On AUTOSTAB No1 (No2), disengage PITCH, ROLL and  *
* YAW levers.                                       *
* On ADC control panel, place TEST selector switch  *
* in position 1. Approximately 30 seconds later,    *
* press ADC1 (ADC2) caption light to reset.         *
* On front face of autostabilization computer No1   *
* (No2), on test plugs ZA and ZB, compare voltage   *
* measured between pins 39 and 60 (ground) of plug  *
* ZA and between plugs 39 and 60 (ground) of plug   *
* ZB. Check that both voltages are identical. IF    *
***************************************************
    |    |
    |    |             ===============================================
   YES   NO-----------| Replace air data computer No1 [26] (No2 [27]). |
    |                  -----------------------------------------------
    |
    |                  -----------------------------------------------
    ------------------| Replace autostabilization computer No1 [5]     |
                      | (No2 [6]).                                     |
                       -----------------------------------------------
```

Chart 114 (Sheet 2 of 2)

```
**************************************
* NO DEFLECTION OF ELEVONS ON        *
* AUTOSTABILIZATION ORDER VIA THE    *
* OPEN LANES OR FAILURE OF COMPARISON*
* FUNCTION. IF                       *
**************************************


*****************************************************
* For test purposes, replace autostabilization      *
* computer No1 [5].                                 *
* On AUTOSTAB No1 (No2), engage levers PITCH, ROLL  *
* and YAW.                                          *
* Repeat operation at which defect was encountered. *
* IF                                                *
*****************************************************
    |   |
    |   |         ---------------------------------------------------
    NO YES--------| Replace removed computer by the new one.        |
    |             ---------------------------------------------------
    |
    |             ---------------------------------------------------
    --------------| Refer to roll control trouble shooting          |
                  | (27-10-00).                                     |
                  ---------------------------------------------------
```

Chart 115

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	MANUAL REF. WIRING DIAGRAM
[1] Lateral accelerometer No 1	231 HF and GF	143	1C36	Passenger compart- ment underfloor	22-22-82 R/I	22-22-02
[2] Lateral accelerometer No 2	231 HF and GH	144	2C36	Passenger compart- ment underfloor	22-22-82 R/I	22-22-06
[3] Yaw rate- gyro No 1	131 WS	Frame 38	1C35	Lower ba- ggage com- partment	22-22-81 R/I	22-22-02
[4] Yaw rate- gyro No 2	132 WS	Frame 38	2C35	Lower ba- ggage com- partment	22-22-81 R/I	22-22-06
[5] Autostabi- lization computer No 1	215 AS	8-215	1C31	Electro- nics rack- LH	22-22-11 R/I	22-22-02 22-22-04 22-22-05
[6] Autostabi- lization computer No 2	216 AS	8-216	2C31	Electro- nics rack - RH	22-22-11 R/I	22-22-06 22-22-08 22-22-09
[7] Monitoring pitch rate-gyro No 1	131 FS	Frame 28	1C38	Lower ba- ggage com- partment	22-22-81 R/I	22-22-05
[8] Monitoring pitch rate-gyro No 2	132 FS	Frame 28	2C38	Lower ba- ggage com- partment	22-22-81 R/I	22-22-09
[9] Control pitch rate-gyro No 1	131 FS	Frame 28	1C33	Lower ba- ggage com- partment	22-22-81 R/I	22-22-05
[10] Control pitch rate-gyro No 2	132 FS	Frame 28	2C33	Lower ba- ggage com- partment	22-22-81 R/I	22-22-09

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	MANUAL REF. WIRING DIAGRAM
[11] Roll rate-gyro No 1	241 JF	151	1C34	Passenger compart-ment underfloor	22-22-81 R/I	22-22-04
[12] Roll rate-gyro No 2	241 JF	152	2C34	Passenger compart-ment underfloor	22-22-81 R/I	22-22-08
[13] Safety flight control computer No 1	215 BS	6-215	1C651	Electro-nics LH rack	27-39-11 R/I	22-22-04 22-22-05
[14] Safety flight control computer No 2	216 BS	6-216	2C651	Electro-nics RH rack	27-39-11 R/I	22-22-08 22-22-09
[15] Circuit breaker		2-213	1C37	Map Ref E5	24-50-00 R/I	22-22-01
[16] Circuit breaker		13-216	2C37	Map Ref D17	24-50-00 R/I	22-22-01

**ON A/C 001-001,

[17 Circuit breaker		2-213	1C42	Map Ref B4	24-50-00 R/I	22-22-01

R **ON A/C 002-007,

[17] Circuit breaker		2-213	1C42	Map Ref A4	24-50-00 R/I	22-22-01
[18] Circuit breaker		13-216	2C42	Map Ref B16	24-50-00 R/I	22-22-01
[19] Pitch relay jack sensor	213 DF	122	C3	Flight compart-ment underfloor	22-12-61 R/I	22-22-01

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	WIRING DIAGRAM
[20] Roll relay jack sensor	213 EF	121	C4	Flight compartment underfloor	22-13-61 R/I	22-22-02 22-22-06
[21] AUTOSTAB No 1 control unit		4-211	1C32	Flight compartment underfloor	22-21-11 R/I	22-22-02 22-22-04 22-22-05
[22] AUTOSTAB No 2 control unit		4-211	2C32	Flight compartment underfloor	22-21-11 R/I	22-22-06 22-22-08 22-22-09
[23] Flight control unit		4-211	C57	Flight compartment ceiling panel	27-36-15 R/I	
[24] Relay	215 BS	6-215	1F106	Electronics LH rack	34-XX-XX	22-22-05
[25] Relay	216 BS	6-216	2F106	Electronics RH rack	34-XX-XX	22-22-09
[26] Air data computer No 1	215 BS	6-215	1F71	Electronics LH rack	34-00-00 R/I	22-22-02 22-22-04 22-22-05
[27] Air data computer No 2	216 BS	6-216	2F71	Electronics RH rack	34-00-00 R/I	22-22-06 22-22-08 22-22-09

Component Identification
Table 101

AUTOSTABILISATION - MAINTENANCE PRACTICES

Interchangeability of Autostabiliser Computers
Autostabiliser Computers marked with a 'T' on the front face are fully interchangeable on the aircraft, however it would help the investigators if these 'T' computers were fitted in the No.2 position of the aircraft.

AUTOSTABILIZATION - ADJUSTMENT/TEST

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

1. General

CAUTION : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

The purpose of the following adjustment/test is to ensure the satisfactory operation of the autostabilization system. This system provides aircraft response damping against various disturbances in order to improve aircraft flight qualities over all the flight envelope. The test is carried out when the aircraft is on the ground, shock absorbers compressed.

2. Operational Test

This test is divided up as follows :

- Check of computers, rate-gyros and accelerometers by means of the ITEM system (on each of the three axes).
- Check of roll-yaw coordination.

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.47 m (14 ft. 8 in.)	
Electrical Ground Power Unit	

B. Prepare

(1) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
NOSE UC WEIGHT SW A SYS SUP	1-213	G 291	M16
LH UC WEIGHT SW A SYS SUP		G 292	M17
RH UC WEIGHT SW & DOWN LOCK A SYS SUP		G 295	M18
AUDIO WARN SYS SUP 1		W 371	M21
MWS SUP 1		W 252	N21
ADC 1 28 V SUP		1F 74	P12
AP/FD SYS 1 CONT		1C 17	Q13
FLT CONT POSN IND CONT		C 83	R11
AFCS TEST 28 V SUP		1C 383	R12
SAFETY FLT CONT No.1 SUP		1C 651	S20
LAT ACCELMTR 26 V SUP	2-213	1C 42	A 4
FLT CONT POSN IND 26 V 400 Hz SUP		C 84	B 4
1ST PLT ADC INST SUP		1F 75	B 3
AP/FD SYS 1 SUP		1C 20	C 5
AUTOSTAB 1 COMP SUP		1C 37	E 5
ADC 1 115 V SUP		1F 73	F 3
LH UC WEIGHT SW & DOWN LOCK B SYS SUP	3-213	G 293	B 8
RH UC WEIGHT SW B SYS SUP		G 294	B 9
NOSE UC WEIGHT SW B SYS SUP		G 296	D 8
AP/FD SYS 2 CONT	5-213	2C 17	A11
AUDIO WARN SYS SUP 2		W 372	C17
MWS SUP 2		W 251	D15
SAFETY FLT CONT No.2 SUP		2C 651	D17
AFCS TEST 2 28 V SUP		2C 383	F11
ADC 2 28 V SUP		2F 74	F12

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AP/FD COMP 1 SUP	13-215	1C 18	A 5
AFCS TEST 1 115V SUP		1C 384	D 6
SAFETY FLT CONT COMP No.1 115 V SUP		1C 652	E 6
SAFETY FLT CONT COMP No.1 26 V SUP		1C 653	F 6
2ND PLT ADC INST SUP	13-216	2F 75	A14
AP/FD SYS 2 SUP		2C 20	A17
LAT ACCLMTR 2 26 V SUP		2C 42	B16
SAFETY FLT CONT COMP No.2 26 V SUP		2C 653	C16
SAFETY FLT CONT COMP No.2 115 V SUP		2C 652	C17
AUTO STAB 2 COMP SUP		2C 37	D17
ADC 2 115 V SUP		2F 73	F15
AFCS TEST 2 115 V SUP		2C 384	F17
AP/FD COMP 2 SUP		2C 18	F18

(2) Reset the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-216	X 345	G 4

(3) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(4) At Flight Engineer's station, on EQUIPMENT BAY COOLING panel, make certain that electronics rack ventilation system is in operation. (Ref. 21-21-00).

(5) Pressurize Blue hydraulic system (Ref. 29-12-00, Servicing) and Green hydraulic system (Ref. 29-11-00, Servicing).

(a) Elevons must return to neutral position.

C. Check of Computers, Rate-Gyros, and Accelerometers by Means of the ITEM system

(1) Yaw axis

(a) On ADC control panel, make certain that TEST selector switches are in NORM position.

(a1) Place ADC 1 switch in ON position

(a2) Press and hold ADC 1 (ADC 2) caption light and place TEST selector switch in position 2.

(a3) Wait until Captain's (First Officer's) Mach indicator indicates Mach 2 before releasing caption light.

(b) Engage YAW engage switch on AUTO STAB No.1 (AUTO STAB No.2) control unit.

(b1) The engage switch must remain in engaged position.

CAUTION : DURING TEST ENGAGE SWITCH RETURNS TO OFF POSITION. DO NOT RE-ENGAGE.

(c) At Flight Engineer's station, on ITEM Control/Indicator panel.

(c1) Place side 1 (2) ITEM-OFF-TEST selector switch in TEST position.

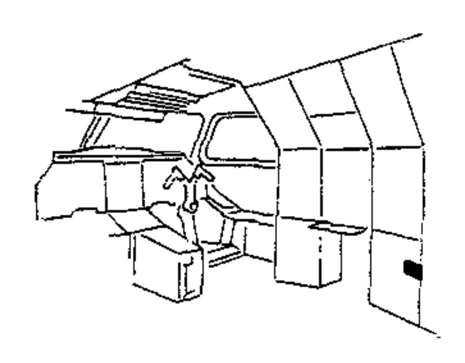
NOTE : This selector switch is of the pull-to-unlock type.

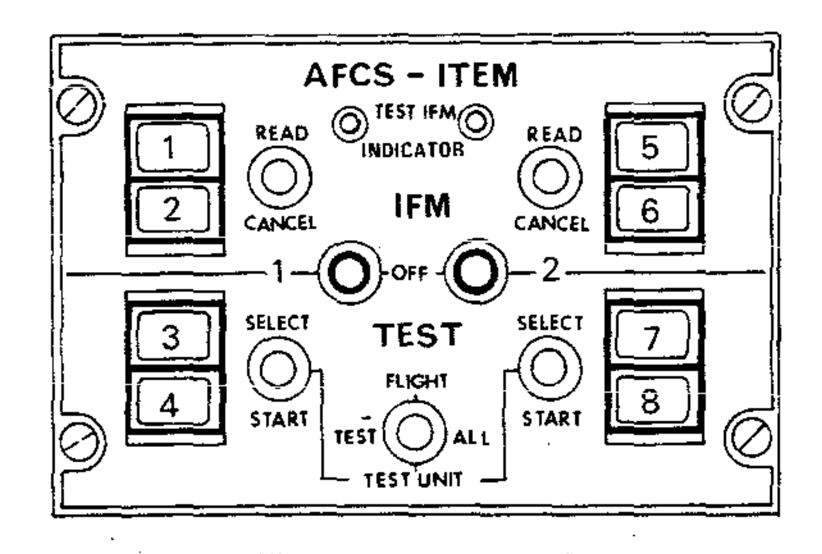
(c2) Place FLIGHT-TEST ALL-TEST UNIT selector switch in TEST UNIT position.

(c3) Check that ITEM and TEST indications appear on indicators 3 and 4, side 1 (7 and 8, side 2) respectively.

(c4) After approximately 2 minutes 30 seconds, check that PASS indication replaces TEST indication at the end of autotest and initialization.

NOTE : If FAIL indication appears in place of TEST indication during this period, this indicates that ITEM computer associated with selected side is de-





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ITEM Control/Indicator Panel
Figure 501

fective.

(c5) Place and hold side 1 (side 2) SELECT/START switch in SELECT position.

(c6) Set AS-Y (Autostabilizer-Yaw) indication on indicator 3 (7) instead of ITEM indication.

NOTE : Indications concerning the AFCS system appear sequentially in the following order :

SFC, AP.P, AP.A, AT, AS.P, AS.R, AS.Y, ET, WLD on indicator 3 (7), depending on side tested.

(c7) Release SELECT/START selector switch when AS.Y indication appears (return to mid-way position by means of a return spring).

(c8) Place SELECT/START selector switch in START position, then release it.

(c9) Check that AS.Y indication remains displayed on indicator 3 (7).

(c10) Check that TEST indication is displayed on indicator 4 (8) replacing PASS indication.

(c11) Check that PASS indication replaces TEST indication on indicator 4 (8) after approximately 12 seconds.

NOTE : PASS indication indicates that yaw axis computation channels are operating correctly as well as the gyro and accelerometer associated with the channels. If a fault is detected in one of these three components, COMP, GYRO or ACCL indication appears in place of PASS indication.

(d) On master warning panel, press STAB warning light to cancel warning.

(e) On ADC control panel press and hold ADC 1 (ADC 2) caption light and place associated TEST selector switch in NORM position.

(e1) Wait until Captain's (First Officer's) Mach indicator indicates Mach 0.25 before re-

leasing caption light.

(f) Place side 1 (side 2) IFM-OFF-TEST selector switch in OFF position and check that no indication remains on indicators 3 and 4 (7 and 8).

(2) Pitch axis

(a) On ADC control panel, make certain that selector switches are in NORM position.

(a1) Place ADC 1 switch in ON position.

(a2) Press and hold ADC 1 (ADC 2) caption light and place TEST selector switch in position 2.

(a3) Wait until Captain's (First Officer's) Mach indicator indicates Mach 2 before releasing caption light.

(b) Engage PITCH engage switch on AUTO STAB No.1 (AUTO STAB No.2) control unit.

(b1) The engage switch must remain in engaged position.

CAUTION : DURING TEST ENGAGE SWITCH RETURNS TO OFF POSITION. DO NOT RE-ENGAGE.

(c) On ITEM control/indicator panel place :

(c1) Side 1 (side 2) IFM-OFF-TEST selector switch in TEST position.

(c2) FLIGHT-TEST ALL-TEST UNIT selector switch in TEST UNIT position.

- Autotest good (Ref. paragraph 2. C. (1) (c3) and (c4), side 1 (side 2).

(c3) By means of SELECT/START selector switch, select AS.P and carry out same operations as those described from paragraph 2. C. (1) (c) (c5) through 2. C. (1) (c) (c10).

(c4) Check that PASS indication replaces TEST indication on indicator 4 (8) after approximately 10 seconds.

NOTE : PASS indication indicates that the pitch axis computation channels and

the associated control and monitoring gyros are operating correctly. If a fault is detected in one of the three components, COMP, GYRO, or GYR-M indication appears in place of PASS indication.

(d) On master warning panel, press STAB warning light to cancel warning.

(e) On ADC control panel, press and hold ADC 1 (ADC 2) caption light and place associated TEST selector switch in NORM position.

(e1) Wait until Captain's (First Officer's) Mach indicator indicates Mach 0.25, before releasing caption light.

(f) Place side 1 (side 2) IFM-OFF-TEST selector switch in OFF position and check that no indication remains on indicators 3 and 4 (7 and 8).

(3) Roll axis

(a) Engage ROLL engage switch on AUTO STAB No.1 (AUTO STAB No.2) control unit.

(a1) The engage switch must remain engaged.

<u>CAUTION</u> : DURING TEST ENGAGE SWITCH RETURNS TO OFF POSITION. DO NOT RE-ENGAGE.

(b) On ITEM control/indicator panel place :

(b1) Side 1 (side 2) IFM-OFF-TEST selector switch in TEST position.

(b2) FLIGHT-TEST ALL-TEST UNIT selector switch in TEST UNIT position.
- Autotest good (Ref. paragraph 2. C. (1) (c3) and (c4), side 1 (side 2).

(b3) By means of side 1 (side 2) SELECT/START selector switch select AS.R and carry out same operations as those described from paragraph 2. C. (1) (c) (c5) through 2. C. (1) (c) (c10).

(b4) Check that PASS indication replaces TEST indication on indicator 4 (8) after approximately 10 seconds.

NOTE : PASS indication indicates that roll axis computation channels are operating correctly as well as the gyro associated with the channels.
If a fault is detected in one of the two components COMP or GYRO indication appears in place of PASS indication.

(c) On master warning panel, press STAB warning light to cancel warning.

(d) Place side 1 (side 2) IFM-OFF-TEST selector switch in OFF position and check that no indication remains on indicators 3 and 4 (7 and 8).

(4) On ADC control panel, place ADC 1 switch in OFF position and ADC 2 switch in ON position, then carry out same operations as those described from paragraph 2 C (1) (a) (a2) through 2. C. (3) (d), referring to information in parentheses for AUTO STAB No.2 lane. Identical results must be obtained.

(5) On ITEM control/indicator panel, place FLIGHT-TEST ALL-TEST UNIT selector switch in FLIGHT position.

(6) On ADC control panel, place ADC 2 switch in OFF position.

D. Check of Roll-Yaw Coordination

(1) Set Flight Controls in electrical mode, and place O & M ELEVONS, IN ELEVONS and RUDDER selector switches in BLUE position (Ref. 27-00-00, Servicing).

(a) Press and release associated reset buttons.

NOTE : For each flight control selection in BLUE-GREEN and MECH, magnetic indicators on ICOVOL (Flight Control Surface Position Indicator) on First Officer's instrument panel must indicate corresponding selection as follows :
B for BLUE, G for GREEN, M for MECH.

NOTE : Movement of elevons in roll sense to right produces a movement of indicator bars on the ICOVOL.
- Upwards for the RH elevons
- Downwards for the LH elevons
and inversely for a roll movement to left.

(2) On centre console

(a) Place the three trim controls, pitch, roll and yaw in 0° position.

(b) On ADC control panel, place ADC 1 and ADC 2 switches in ON position, with the two associated TEST selector switches in NORM position.

(b1) If ADC 1 and ADC 2 caption lights illuminate, reset by pressing caption lights, which must extinguish.

(3) On flight control unit, place ANTI STALL SYSTEM No.1 switch in ON position.

(4) On AUTO STAB No.1 control unit, engage the three PITCH, ROLL and YAW engage switches.

(a) The three engage switches must remain engaged.

(b) SYSTEM 1 FAIL warning light must extinguish.

(c) Check that there is no elevon deflection.

(d) Check that there is no rudder deflection.

(5) Turn roll control wheel to the right.

(a) Check on ICOVOL that rudder control indicator bars (in particular) move to the right.

(6) Turn roll control wheel to the left.

(a) Make certain that rudder control indicating bars (in particular) on ICOVOL move to the left.

(7) Set roll control wheel to zero.

(8) On flight control unit, place O & M ELEVONS, IN ELEVONS and RUDDER switches in GREEN position.

(9) Carry out the operations described from paragraph 2. D. (5) through paragraph 2. D. (7). The same results must be obtained.

(10) On AUTOSTAB No.1 control unit, disengage the three PITCH, ROLL and YAW engage switches.

(a) On master warning panel, STAB red warning light must illuminate.

(b) The gong aural warning must sound.

(11) On master warning panel, press STAB warning light in order to cancel aural warning.

(12) On flight control unit, place ANTI STALL SYSTEM No.1 switch in OFF position, and ANTI STALL SYSTEM No.2 switch in ON position.

(a) SYST 1 FAIL caption light must extinguish and SYS 2 FAIL caption light must illuminate.

(13) Engage the three PITCH, ROLL and YAW engage switches on AUTO STAB No.2 control unit.

(a) The three engage switches must remain engaged.

(b) Associated SYST2 FAIL warning light must extinguish.

(c) Check that there is no elevon deflection.

(d) Check that there is no rudder deflection.

(14) Turn roll control wheel to the right.

(a) Check on the ICOVOL that rudder control indicator bars (in particular) move to the right.

(15) Turn roll control wheel to the left.

(a) Check on ICOVOL that rudder control indicator bars (in particular) move to the left.

(16) Set roll control wheel to zero.

(17) On flight control unit, place O & M ELEVONS, IN ELEVONS and RUDDER switches in BLUE position.

(a) Press associated RESET buttons.

(18) Repeat the operations described from paragraph 2. D. (14) through paragraph 2. D. (16). The same results must be obtained.

(19) Disengage the three PITCH, ROLL and YAW engage switches on AUTOSTAB No.2 control unit.

(a) On master warning panel : STAB red warning light must illuminate.

(b) The gong aural warning must sound.

(20) On master warning panel, press STAB warning light to cancel warning.

E. Close-Up

(1) On flight control unit (Ref. 27-00-00, Servicing)

(a) Place ANTI STALL SYSTEM No.2 switch in OFF position.

- Associated SYST 2 FAIL warning light must extinguish.

(b) Place O & M ELEVONS, IN ELEVONS and RUDDER switches in MECH position.

(c) Place the two BLUE INVERTER and GREEN INVERTER switches in PWR OFF position.

- Both FAIL warning lights must illuminate.

(2) On ADC control panel, place ADC 1 and ADC 2 switches in OFF position.

(3) Trip the following circuit breakers

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-213	X 345	G 4

(4) Shut down and disconnect Blue hydraulic power unit (Ref. 29-12-00, Servicing) and Green hydraulic power unit (Ref. 29-11-00, Servicing).

(a) Elevons must deflect downwards.

(5) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(6) Remove access platform.

3. Functional Test

The test is divided up as follows :

- Check of computers, rate-gyros, and accelerometers by means of the ITEM on each of the three axes.
- Check of engagement conditions.
- Check of open lane control.
- Check of roll-yaw coordination with gain change.

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.47 m (14 ft. 8 in.)	
Electrical Ground Power Unit	
Circuit Breaker Safety Clips	

B. Prepare

NOTE : Each test can be carried out indepently. However work preparation is common to all tests.

(1) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
NOSE UC WEIGHT SW A SYS SUP	1-213	G 291	M16
LH UC WEIGHT SW A SYS SUP		G 292	M17
RH UC WEIGHT SW & DOWN LOCK A SYS SUP		G 295	M18
AUDIO WARN SYS SUP 1		W 371	M21
MWS SUP 1		W 252	N21
ADC 1 28 V SUP		1F 74	P12
AP/FD SYS 1 CONT		1C 17	Q13
FLT CONT POSN IND CONT		C 83	R11
AFCS TEST 28 V SUP		1C 383	R12
SAFETY FLT CONT No.1 SUP		1C 651	S20
LAT ACCELMTR 26 V SUP	2-213	1C 42	A 4
FLT CONT POSN IND 26 V 400 Hz SUP		C 84	B 4
1ST PLT ADC INST SUP		1F 75	B 5

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AP/FD SYS 1 SUP		1C 20	C 5
AUTO STAB 1 COMP SUP		1C 37	E 5
ADC 1 115 V SUP		1F 73	F 3
LH UC WEIGHT SW & DOWN LOCK B SYS SUP	3-213	G 293	B 8
RH UC WEIGHT SW B SYS SUP		G 294	B 9
NOSE UC WEIGHT SW B SYS SUP		G 296	D 8
AP/FD SYS 2 CONT	5-213	2C 17	A11
AUDIO WARN SYS SUP 2		W 372	C17
MWS SUP 2		W 251	D15
SAFETY FLT CONT No.2 SUP		2C 651	D17
AFCS TEST 2 28 V SUP		2C 383	F11
ADC 2 28 V SUP		2F 74	F12
AP/FD COMP 1 SUP	13-215	1C 18	A 5
AFCS MODE SYST 1 LTS SUP		1C 273	B 5
AFCS TEST 1 115 V SUP		1C 384	D 6
SAFETY FLT CONT COMP No.1 115 V SUP		1C 652	E 6
SAFETY FLT CONT COMP No.1 26 V SUP		1C 653	F 6
2ND PLT ADC INST SUP	13-216	2F 75	A14
AP/FD SYS 2 SUP		2C 20	A17
LAT ACCELMTR 2 26 V SUP		2C 42	B16
SAFETY FLT CONT COMP No.2 26 V SUP		2C 653	C16
SAFETY FLT CONT COMP No.2 115 V SUP		2C 652	C17
AUTOSTAB 2 COMP SUP		2C 37	D17
AFCS MODE SYST 2 LTS SUP		2C 273	E17
ADC 2 115 V SUP		2F 73	F15
AFCS TEST 2 115 V SUP		2C 384	F17
AP/FD COMP 2 SUP		2C 18	F18

(2) Reset the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-216	X 345	G 4

(3) Trip, safety and tag the following circuit breaker :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
STICK SHAKER SUP	1-213	W 513	P15

(4) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(5) At Flight Engineer's station, on EQUIPMENT BAY COOLING panel, make certain that electronics racks ventilation is in operation. (Ref. 21-21-00).

(6) Pressurize Blue hydraulic system (Ref. 29-12-00, Servicing) and Green hydraulic system (Ref. 29-11-00, Servicing).

(a) Elevons must return to neutral position.

C. Test of Computers, Rate Gyros and Accelerometers by means of the ITEM system

(1) Repeat the procedure described in the operational test from paragraph 2. C. (1) (a) through paragraph 2. C. (6).

D. Check of Engage Conditions

(1) Set Flight Controls in electrical mode and place O & M ELEVONS, IN ELEVONS and RUDDER selector switches in BLUE position (Ref. 27-00-00, Servicing).

(a) Press and release associated RESET buttons.

NOTE : For each selection of flight controls in BLUE, GREEN and MECH modes, ICOVOL magnetic indicators on First Officer's instrument panel must indicate corresponding selection that is, B for BLUE, G for GREEN, M for MECH.

(2) On centre console

(a) Place the three trim control wheels, pitch, roll and yaw in 0° position.

(b) On ADC control panel, place the two ADC 1 and ADC 2 switches in ON position, with the two associated TEST selector switches in NORM position.

(b1) If the two ADC 1 and ADC 2 caption lights illuminate, reset by pressing caption lights, which must extinguish.

(3) On flight control unit, place the two ANTI STALL SYSTEM 1 and 2 switches in ON position.

(a) The two SYST FAIL warning lights must illuminate.

(4) Engage PITCH engage switch on each AUTO STAB No.1 and No.2 control unit.

(a) The two engage switches must remain in engaged position.

(b) The two SYST FAIL warning lights must extinguish.

(5) On flight control unit, place ANTI STALL SYSTEM 1 switch in OFF position.

(a) PITCH engage switch on AUTO STAB No.1 control unit must return to OFF position.

(b) SYST 1 FAIL warning light must illuminate.

(6) Check that PITCH engage switch on AUTO STAB No.1 control unit cannot hold in engaged position.

(7) On flight control unit, place ANTI STALL SYSTEM 2 switch in OFF position.

(a) PITCH engage switch on AUTO STAB No.2 control unit must remain engaged.

(8) Disengage PITCH engage switch on AUTO STAB No.2 control unit.

(9) Engage PITCH engage switch on AUTO STAB No.1 control unit.

(a) Engage switch must remain in engaged position.

(10) Check that PITCH engage switch on AUTO STAB No.2 control unit cannot remain in engaged position.

(11) On ADC control panel

(a) Place the two TEST selector switches in position 2

(12) Check that AUTO STAB No.1 PITCH engage switch returns to OFF position.

(13) Wait approximately 1 minute, then press ADC1 and ADC2 caption lights to reset.

(14) Engage PITCH, ROLL and YAW engage switches on each AUTO STAB No.1 and No.2 control unit.

(a) The engage switches must remain in engaged position.

(15) On circuit breaker panel 2-213, trip and reset circuit breaker 1C37, map ref E5.

(a) PITCH, ROLL, and YAW engage switches on AUTO STAB No.1 control unit must return to OFF position.

(16) On circuit breaker panel 13-216, trip and reset circuit breaker 2C37, map ref D17.

(a) PITCH, ROLL, and YAW engage switches on AUTO STAB

No.2 control unit must return to OFF position.

(b) On master warning panel, STAB red warning light must illuminate.

(c) Gong aural warning sounds.

(17) On master warning panel, press STAB warning light to cancel warning.

(18) On ADC control panel, place the two TEST selector switches in NORM position.

(a) Wait approximately one minute, then press ADC1 and ADC2 caption lights to reset.

(19) On flight control unit, place ANTI STALL SYSTEM 1 switch in ON position.

(20) Engage PITCH engage switch on AUTO STAB No.1 (AUTO STAB No.2) control unit.

(a) Engage switch must remain in engaged position.

(b) SYST FAIL 1 (2) warning light must extinguish.

(21) On circuit breaker panel 13-215 (13-216) trip and reset circuit breaker 1C652 (2C652); map ref E6 (C17).

(a) PITCH engage switch on AUTO STAB No.1 (AUTO STAB No.2) control unit must return to OFF position.

(b) SYST FAIL 1 (2) warning light must illuminate.

(c) On master warning panel, STAB red warning light must illuminate.

(d) Gong aural warning sounds.

(22) On master warning panel, press STAB warning light to cancel warning.

(23) On flight control unit place ANTI STALL SYSTEM 1 switch in OFF position and ANTI STALL SYSTEM 2 switch in ON position, and carry out same operations as those described from paragraphs 3. D. (20) through 3. D. (22) referring to information in parentheses. The same results must be obtained.

(24) On flight control unit, place ANTI STALL SYSTEM 2 switch in OFF position.

(25) Engage YAW engage switch on AUTO STAB No.1 control unit

(a) Engage switch must remain in engaged position.

(26) On ADC control panel, place ADC 1 switch in OFF position.

(a) Engage switch must not return to OFF position.

(27) Engage YAW engage switch on AUTO STAB No.2 control unit

(a) YAW engage switch on AUTO STAB No.1 control unit must return to OFF position.

(28) On ADC control panel

(a) Place ADC1 switch in ON position.

(b) Press and hold ADC 1 and ADC 2 caption lights, then place TEST selector switches in position 2.

(c) Wait until Captain's and First Officer's Mach indicators indicate Mach 2 before releasing caption lights.

(29) Engage YAW and PITCH engage switches on AUTO STAB No.1 control unit.

(a) Both engage switches must remain in engaged position.

(30) On circuit breaker panel 2-213, trip and reset circuit breaker 1C42, map ref A4.

(a) YAW and PITCH engage switches on AUTO STAB No.1 control unit must return to OFF position.

(31) Engage PITCH engage switch on AUTO STAB No.2 control unit.

(a) Engage switch must remain in engaged position.

(32) On circuit breaker panel 13-216, trip and reset circuit breaker 2C42, map ref B16.

(a) YAW and PITCH engage switches on AUTO STAB No.2 control unit must return to OFF position.

(b) On master warning panel, STAB red warning light must illuminate.

(c) Gong aural warning sounds.

(33) On master warning panel, press STAB warning light to cancel warning.

(34) On ADC control panel place the two TEST selector switches in NORM position.

(a) Wait approximately one minute, then press ADC1 and ADC2 caption lights to reset.

NOTE : For the rest of this test, no mention will be made of triggering of warnings.

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E. Check of Open Lane Control

(1) On ADC control panel place the two ADC 1 and ADC 2 switches in ON position, with the two associated TEST selector switches in NORM position.

(a) If the ADC 1 and ADC 2 caption lights illuminate, reset by pressing caption lights.

(2) On flight control unit, place the three O & M ELEVONS, IN ELEVONS and RUDDER switches in BLUE position.

(a) Press and release associated RESET buttons.

(3) With PITCH, ROLL and YAW engage switches on the two AUTO STAB No.1 and No.2 control units in OFF position, turn Captain's control wheel to right then to left.

(a) Check on ICOVOL that there is no deflection of rudder indicator bars.

(4) Push Captain's control column until elevon indicator bars on ICOVOL indicate approximately 6° in nose down sense.

(5) Holding Captain's control column in this position press emergency flight control button on Captain control column behind EMERG CONT engage button.

(a) On ICOVOL, elevon indicator bars remain at same value, that is, approximately 6° in nose down sense.

(6) Return Captain's control column to 0° position then turn control wheel to right until ICOVOL indicator bars indicate approximately 10° roll to right.

NOTE : Elevon deflection in roll to right sense is indicated on ICOVOL by deflection of indicator bars :

- upwards for right elevons
- downwards for left elevons

and inversely for roll to left.

(7) Holding Captain's control wheel in this position, press emergency flight control button.

(a) On ICOVOL, elevon indicator bars remain at same value, that is 10° roll to right.

(8) Return Captain's control wheel to 0°.

(9) On flight control unit, place ANTI STALL SYSTEM 1 and 2 switches in ON position.

(10) Engage the PITCH, ROLL and YAW engage switches on AUTO STAB No.1 and AUTO STAB No.2 control units.

(a) The engage switches must remain in engaged position.

(b) SYST FAIL 1 and 2 warning lights must extinguish.

(11) Push Captain's control column until elevon indicator bars on ICOVOL indicate approximately 6° in nose down sense.

(12) Hold Captain's control column in this position and press emergency flight control test button.

(13) On ICOVOL, check that elevon deflection can be noticed.

(14) Release emergency flight control test button and return Captain's control column to 0° position then turn control wheel to right until elevon indicator bars indicate approximately 10° to right.

(a) On ICOVOL, check that rudder deflection is approximately 10°.

(15) Hold Captain's control wheel in this position and press emergency flight control test button.

(a) On ICOVOL, check that outer and middle elevon deflection can be noticed.

(16) Return Captain's control wheel to 0° position.

(17) On flight control unit, place O & M ELEVONS, IN ELEVONS and RUDDER selector switches in GREEN position, then carry out operations described from paragraph 3. E. (11) through 3. E. (16). The same results must be obtained.

(18) Disengage AUTO STAB No.1 (AUTO STAB No.2) PITCH, ROLL, and YAW engage switches. Repeat operations described from 3E (11) through 3E (18), using Blue and Green electrical mode. The same results must be obtained.

(19) On master warning panel, press STAB red warning light to cancel warning.

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(20) On flight control unit, place the two ANTI STALL SYSTEM 1 and 2 switches in OFF position.

F. Check of Roll-Yaw Coordination with Gain Change

(1) On ADC control panel, place ADC 1 switch in ON position, with associated TEST switch in NORM position.

(a) If ADC 1 caption light illuminates, reset by pressing caption light.

(2) On flight control unit place O & M ELEVONS, IN ELEVONS and RUDDER switches in BLUE position.

(a) Press and release associated RESET buttons.

(b) Place ANTI STALL SYSTEM No.1 switch in ON position

- SYST 1 FAIL caption light must illuminate.

(3) Engage PITCH, ROLL and YAW engage switches on AUTO STAB No.1 control unit.

(a) The three engage switches must remain in engaged position.

(b) The associated SYST 1 FAIL warning light must extinguish.

(c) Check that there is no elevon deflection.

(d) Check that there is no rudder deflection

(4) Rotate ROLL TRIM control wheel to the right until both rudder indicator bars have moved by + 4° to the right on the ICOVOL.

(5) Rotate ROLL TRIM control wheel to the left until both rudder indicator bars reach - 4° to the right on the ICOVOL.

(6) Set ROLL TRIM control to 0°.

(7) On ADC control panel,

(a) Press and hold ADC 1 (ADC 2) caption light

(b) Place associated TEST selector switch in position 1 (Mach simulation = 0.65).

(c) Wait until associated blue TEST caption light illuminates.

(d) Release ADC1 (ADC2) caption light :

- Captain's (First Officer's) Mach indicator must display M = 0.63.

(8) Select 4° to the right value by means of the roll trim control.

(a) Check on ICOVOL that both rudder indicator bars have moved by + 1° to the right.

(9) Select 4° to the left value by means of the roll trim control.

(a) Check on ICOVOL that both rudders have moved by - 1° to the left.

(10) Set roll trim control to 0°.

(11) On ADC control panel,

(a) Press and hold ADC 1 (ADC 2) caption light.

(b) Place associated TEST selector switch in NORM position.

(c) Associated TEST caption light extinguishes.

(d) Release ADC1 caption light.

(12) On flight control unit, place O & M ELEVONS, IN ELEVONS and RUDDER switches in GREEN position.

(13) On centre console, carry out operations described from paragraph 3. F. (4) through paragraph 3. F. (11) (d).

(14) On AUTOSTAB No.1 control unit, disengage the PITCH, ROLL and YAW engage switches.

(15) On master warning panel, press STAB indicator light in order to cancel warning.

(16) On flight control unit, place ANTI STALL SYSTEM 1 switch in OFF position.

(17) On ADC control panel

(a) Place ADC1 switch in OFF position.

(b) Place ADC2 switch in ON position.

(c) If ADC2 caption light illuminates, press to

extinguish.

(18) On flight control unit

(a) Place O and M ELEVONS, IN ELEVONS and RUDDER selector switches in BLUE position.

(b) Press and release associated RESET buttons.

(c) Place ANTI STALL SYSTEM 2 switch in ON position - SYST 2 FAIL warning light must illuminate.

(19) Engage PITCH, ROLL and YAW engage switches on AUTO STAB No.2 control unit.

(a) The three engage switches must remain in engaged position.

(b) SYST 2 FAIL warning light must extinguish.

(c) Check that there is no elevon movement.

(d) Check that there is no rudder movement.

(20) Carry out same operations for AUTO STAB No.2 lane as those described from paragraph 3. F. (4) through 3. F. (13) referring to information in parentheses. The same results must be obtained.

(21) Disengage PITCH, ROLL and YAW engage switches on AUTO STAB No.2 control unit.

(22) On master warning panel, press STAB warning light to cancel warning.

G. Close-Up

(1) On flight control unit (Ref. 27-00-00, Servicing).

(a) Place ANTI STALL SYSTEM No.2 switch in OFF position.

(b) SYST 2 FAIL warning light must extinguish.

(c) Place O & M ELEVONS, IN ELEVONS and RUDDER selector switches in MECH position.

(d) Place BLUE INVERTER and GREEN INVERTER switches in PWR OFF position.
- The two FAIL warning lights must illuminate.

(2) On ADC control panel, place ADC 1 and/or ADC 2 switch in OFF position.

(3) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-213	X 345	G 4

(4) Reset the following circuit breaker :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
STICK SHAKER SUP	1-213	W 513	P15

(5) Shut down and disconnect Blue hydraulic power unit (Ref. 29-12-00, Servicing) and Green hydraulic power unit (Ref. 29-11-00, Servicing).

(a) Elevons must deflect downwards.

(6) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(7) Remove access platform.

4. System Test
(Ref. Fig. 502)

As well as the functional test this test includes two checks, i.e.

- check of K gains and limits, including neutralization of outer elevons
- measurement of lateral accelerometer null points

The check of K gains and limits is carried using the Flight Controls Electrical Circuits Test Set, starting at test series 3, step 7 (Ref. 27-17-00, Adjustment/Test, Functional Test paragraph 3).

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.47 m (14 ft. 8 in.)	
Access Platform 4.24 m (13 ft. 11 in.)	
Electrical Ground Power Unit	
VOR/ILS Ground Test Unit	
Simulators - Pressure Sensors	87209455
Test Set - Electrical Circuits - Flight Controls	3156100
Multimeter	

B. Prepare

(1) Carry out work preparation for electrical monitoring channels test (Ref. 27-17-00, Adjustment/Test paragraph 3.C.).

(2) Carry out work preparation for functional test (Ref. 22-22-00, Adjustment/Test paragraph 3.B.).

(3) On test set control and display panel

(a) Place TEST SERIES SELECTION switch in position 3.

(b) Place AUTOMATIC-STEP BY STEP switch in STEP BY STEP position.

ON
DIM BRIGHT
SERIES N° TEST N°
3 06
END
CORRECT FAIL
SELECTION
RESET B.MODE
A/S1 G.MODE
A/S2 M.MODE
TEST SERIES SELECTION
AUTOMATIC
0 1 2 3
STEP BY STEP
ORDER ON
ICOVOL B G M A
PILOT VALVES B1 B2 G1 G2
CONTROLS G1 G2 M1 M2
SELF LOCKING B/G1 B/G2 G/M1 G/M2
COMPARATORS B1 B2 G1 G2
OUT. MID ELEVONS
INNER ELEVONS
RUDDER
STEP BY STEP
RESET
INVERTERS B G
FAILURES DETECTION T F
LINEAR TRANSDUCER B G
SEIZURES B G
PFC JACK
RELAY JACK
MECANICAL LINKAGE
RELAY JACK SOLENOID VALVES B G Y/B Y/G
FLT TEST

(BEFORE SELECTION ON AIRCRAFT PANEL)

ON
DIM BRIGHT
SERIES N° TEST N°
3 06
END
CORRECT FAIL
SELECTION
RESET B.MODE
A/S1 G.MODE
A/S2 M.MODE
TEST SERIES SELECTION
AUTOMATIC
0 1 2 3
STEP BY STEP
ORDER ON
ICOVOL B G M A
PILOT VALVES B1 B2 G1 G2
CONTROLS G1 G2 M1 M2
SELF LOCKING B/G1 B/G2 G/M1 G/M2
COMPARATORS B1 B2 G1 G2
OUT. MID ELEVONS
INNER ELEVONS
RUDDER
STEP BY STEP
RESET
INVERTERS B G
FAILURES DETECTION T F
LINEAR TRANSDUCER B G
SEIZURES B G
PFC JACK
RELAY JACK
MECANICAL LINKAGE
RELAY JACK SOLENOID VALVES B G Y/B Y/G
FLT TEST

(AFTER SELECTION ON AIRCRAFT PANEL)

CMA 22 22 00 5 BCM10

Test Set Display Panel
Figure 502

(c) On test set front panel turn knurled knob to bring ledex No.3 to position 6.

- check that 3-06 is displayed in SERIES No. TEST No. display window (take no notice of MECH JAM warning light on flight control unit, on ceiling panel).
- check that B-MODE, RESET and AS1 indicator lights illuminate.

(4) On flight control unit, place O&M ELEVONS, IN ELEVONS and RUDDER selector switches in BLUE position.

(a) Press and release associated RESET buttons.

(b) The eight magnetic indicators on ICOVOL must display B.

NOTE : Movement of elevons in roll sense to right produces a movement of indicator bars on the ICOVOL
- Upwards for the RH elevons
- Downwards for the LH elevons and inversely for a roll movement to left.

(5) As LAND mode and LOC beam and GLIDE beam capture are selected during test, make certain that both channels of AP/FD system can be engaged (Ref. 22-10-00, Servicing).

(6) On ADC control panel, make certain that the two ADC1 and ADC2 switches are in OFF position and that associated TEST selector switches are in NORM position.

(a) Switches and potentiometers of pressure sensor simulators must be in following configuration :

SENSOR - SIMUL	on SENSOR
I LOCAL - I = 1°, I = 0.24°	on I LOCAL
PROBE CORRECTION - LOCKED	on PROBE CORRECTION
AIRSPEED	on 0 kt
ALTITUDE	on 1013 mb.

(7) Remove access panel 215ES for shelf 6-215 and 216ES for shelf 6-216. Connect a pressure sensor simulator to test connector on front panel of each ADC.

C. Check of K Gains and Limits

(1) Engage the three PITCH, ROLL and YAW engage switches on AUTO STAB No.1 control unit.

(2) On test set control and display panel

(a) place ORDER switch in ON position

(b) press and release RESET push-button

(3) Test 3-07, Roll

(a) Transmission of roll order

- Outer and middle elevons must deflect approximately 2.4°, roll to the right.

(b) On test set control and display panel, place ORDER switch in upper position.

- Outer and middle elevons must return to 0° position.

(c) On ADC control panel, place ADC 1 (ADC 2) switch in ON position.

- Press and release corresponding caption light to reset.

(d) On test set control and display panel, place ORDER switch in ON position

- Outer and middle elevons must deflect approximately 4.8°, roll to the right

(e) On test set control and display panel, place ORDER switch in upper position

- Outer and middle elevons must return to 0° position.

(f) On ADC control panel, place ADC2 (ADC1) switch in ON position and corresponding TEST selector switch in position 1.

- Wait until corresponding blue TEST indicator light illuminates to reset by pressing ADC 2 (ADC 1) caption light.

(g) On test set control and display panel, place ORDER

switch in ON position.

- Outer and middle elevons must deflect approximately 2.4°, roll to the right.

(h) On test set control and display panel, place ORDER switch in upper position.

- Outer and middle elevons must return to 0° position.

(i) On ADC control panel, place ADC2 (ADC1) TEST selector switch in NORM position and corresponding ADC 2 (ADC 1) switch in OFF position.

(j) On test set control and display panel place ORDER switch in ON position

- Outer and middle elevons must deflect approximately 4.8°, roll to the right.

(k) On pressure sensor simulator connected to ADC 1 (ADC 2) place following switches in configuration shown below :

SENSOR SIMUL	on SIMUL
I LOCAL - I = 1°, I = 0.24°	on I = 1°, I = 0.24°
PROBE CORRECTION LOCKED	on LOCKED

(l) On ADC control panel, reset by pressing ADC 1 (ADC 2) warning light.

(m) On pressure sensor simulator set a mach number of 0.65.

- Outer and middle elevons must deflect approximately 2.4°, roll to the right.

(n) Set a mach number of 1.3.

- Outer and middle elevons must remain in previous configuration

(o) Set a mach number of 2.3.

- Outer and middle elevons must deflect approximately 5.7°, roll to the right

(p) On test set control and display panel, place ORDER switch in upper position.

- Outer and middle elevons must return to 0° position

(q) On pressure sensor simulator, set mach number of 0.65.

(r) On AFCS control unit, engage AP 1 and FD 1 (AP 2 and FD 2) engage switches (Ref. 22-10-00, Servicing).

(s) With Captain's (First Officer's) RAD/INS selector switch in RAD position, set an ILS frequency

(t) Select LAND mode on AFCS control unit, then carry out LOC beam and GLIDE beam capture.

(u) On test set control and display panel, place ORDER switch in ON position

- Outer and middle elevons must deflect approximately 4.8°, roll to the right

(v) On pressure sensor simulator set a mach number of 0.25.

- Outer and middle elevons must remain in previous configuration.

(w) On test set control and display panel, place ORDER switch in upper position.

- Outer and middle elevons must return to 0° position.

(x) On AFCS control unit, disengage AP1 and FD1 (AP 2 and FD2) engage switches.

(y) Cancel AP warning by pressing Captain's AP disconnect (AP DISC) push-button located on control column handwheel.

(z) On test set control and display panel, place ORDER switch in ON position.

- Outer and middle elevons must deflect approximately 4.8°, roll to the right.

(aa) On pressure sensor simulator set on IAS greater than 270 kt, then turn ROLL TRIM control wheel to the right until inner elevons deflect 5°.

- Rudder must deflect approximately 4° to the right (approximately 8° if IAS is less than 270 kt).

(ab) Set altitude of 1000 ft. and IAS of 430 kts.

- Outer elevons must return to 0° position.

(ac) Set IAS of 400kt.

- Outer elevons must deflect to position of middle elevons, i.e. approximately 2.4°, and rudders must deflect approximately 2° to the right.

(ad) Place ROLL TRIM control wheel in 0° position, then set mach number of 0.25 on pressure sensor simulator.

- Rudders and inner elevons must return to 0° position.
- Outer and middle elevons must deflect to approximately 4.8°, roll to the right.

(ae) On test set control and display panel, press and release RESET push-button.

(4) Test 3-08, Pitch

(a) Transmission of pitch order

- The six elevons deflect approximately 4° upwards

(b) On test set control and display panel, place ORDER switch in upper position.

- The six elevons must return to 0° position.

(c) On pressure sensor simulator place SENSOR-SIMUL switch in SENSOR position, then place ADC1 (ADC2) switch on ADC control panel in OFF position.

(d) On test set control and display panel, place ORDER switch in ON position

- The six elevons must deflect approximately 1° upwards.

(e) On test set control and display panel, place ORDER switch in upper position.

- The six elevons must return to 0° position.

(f) On ADC control panel, place ADC1 (ADC2) switch in ON position.

(f1) Reset by pressing ADC1 (ADC2) caption light then set ADC2 (ADC1) switch in ON position and associated TEST selector switch in position 1.

- Wait approximately 30 seconds, then reset by pressing ADC2 (ADC1) caption light.

(g) On test set control and display panel, place ORDER switch in ON position.

- The six elevons must deflect approximately 1° upwards.

(h) On test set control and display unit, place ORDER switch in upper position.

(i) On ADC control panel, place ADC 2 (ADC 1) TEST selector switch in NORM position and associated ADC 2 (ADC 1) switch in OFF position.

(j) On pressure sensor simulator, place SENSOR - SIMUL

switch in SIMUL position ; on ADC control panel, reset by pressing ADC 1 (ADC 2) caption light.

(j1) Set a mach number of 0.65.

(k) On test set control and display panel, place ORDER switch in ON position.

- The six elevons must deflect approximately 1° upwards.

(l) Increase mach number to 0.90.

- The six elevons remain in same position, i.e. 1° deflection.

(m) Increase mach number to 2.3.

- The six elevons must deflect approximately 2.3° upwards.

(n) On test set control and display panel, place ORDER switch in upper position.

- The six elevons must return to 0° position.

(o) On pressure sensor simulator, set a mach number of 0.65.

(p) On AFCS control unit, engage AP1 and FD1 (AP2 and FD2) engage switches (Ref. 22-10-00, Servicing).

(q) Select LAND mode, then carry out LOC beam and GLIDE beam capture.

(r) On test set control and display panel, place ORDER switch in ON position.

- The six elevons must deflect approximately 4° upwards.

(s) On pressure sensor simulator set a mach number of 0.25 ; disengage AP1 and FD1 (AP2 and FD2) engage switches on AFCS control unit.

The six elevons remain in same position, i.e. approximately 4° upward deflection.

(t) On centre console turn pitch trim control wheel to produce elevon deflection of 10° upwards.

(u) On pressure sensor simulator, set altitude of 1000 ft, then IAS of 430 kt.

- Outer elevons must return to 0° position.

(v) On pressure sensor simulator, set IAS of 400kt.

- Outer elevons must return to same deflection as middle and inner elevons.

(w) Place pitch trim control wheel at 0° position.

(x) On test set control and display panel, press and release RESET push-button.

(5) Test 3-09, Yaw

(a) On pressure sensor simulator, place I LOCAL - I = 1°, I = 0.24° switch in I LOCAL position, then set a mach number of 0.25.

(b) In zone 113 (114) move LH (RH) angle of attack sensor vane slowly to obtain an angle of attack less than 13°, as read on Captain's (First Officer's) angle of attack indicator.

(c) Transmission of yaw order

- Rudders remain in 0° position

(d) On test set control and display panel, place ORDER switch in upper position.

(e) On pressure sensor simulator, set mach number of 2

(f) On test set control and display panel, place ORDER switch in ON position.

- Rudders must deflect approximately 4° to the left, then after approximately 50 seconds they must return to 0° position.

(g) On test set control and display panel, place ORDER switch in upper position and wait until rudders return completely to 0° position.

(h) On pressure sensor simulator, set an 1AS of less than 270 kt. for a mach number of 0.25.

(i) Move LH (RH) angle of attack sensor vane to obtain an angle of attack of 15°.

(j) On test set control and display panel, place ORDER switch in ON position.

- Rudders must deflect approximately 8° to the left.

(k) On test set control and display unit, place ORDER switch in upper position.

- Rudders must return to 0° position.

(l) On pressure sensor simulator, set an airspeed greater than 270 kt.

(m) On test set control and display panel, place ORDER switch in ON position.

- Rudders must not move.

(n) On test set control and display panel, place ORDER switch in upper position ; press and release RESET push-button.

(o) Move LH (RH) angle of attack sensor vane to approximately 0° angle of attack position.

(p) On pressure sensor simulator connected to ADC 1 (ADC 2), place the various switches and potentiometers in their original configuration (Ref. paragraph 4.B. (7) (a)).

(6) Test 3-10

(a) On test set control and display panel, place ORDER switch in ON position.

(b) The eight magnetic indicators on ICOVOL must display a green G.

(c) On test set control and display panel, press then release RESET push-button.

(7) Test 3-11, Roll

(a) Carry out same procedure as for test 3-07 (Ref. paragraph 4. C. (3)), with the following changes :

Read "roll to the left" instead of "roll to the right"
Read "turn control wheel to left" instead of "turn control wheel to right"
Read "rudders deflect to the left" instead of "rudders deflect to the right"

(8) Test 3-12, Pitch

(a) Carry out same procedure as for test 3-08 (Ref. paragraph 4. C. (4)), with the following change :

Read "downwards" instead of "upwards".

(9) Test 3-13, Yaw

Carry out same procedure as for 3-09 (Ref. paragraph 4. C. (5)), with the following change :

Read "rudders deflect to right" instead of "rudders deflect to left".

(10) Test 3-14

(a) Place ORDER switch in ON position

(b) The eight magnetic indicators on ICOVOL must display a blue B.

(c) On pressure sensor simulator connected to ADC 2, place SIMUL-SENSOR switch in SIMUL position.

(d) On pressure sensor simulator connected to ADC 1, place SIMUL-SENSOR switch in SENSOR position.

(e) On ADC control panel, place ADC 1 switch in OFF position.

(f) On test set control and display panel AS 2 indicator light must illuminate.

(g) Disengage the three PITCH, ROLL and YAW engage switches on AUTO STAB No.1 control unit and engage the three PITCH, ROLL and YAW engage switches on AUTO STAB No.2 control unit.

- The three engage switches must hold in engaged position.

(h) On test set control and display panel, press and release RESET push-button.

(11) Test 3-15, Roll

(a) Carry out same procedure as for test 3-07 (Ref. paragraph 4. C. (3)) referring to information between parentheses.

(12) Test 3-16, Pitch

(a) Carry out same procedure as for test 3-08 (Ref. paragraph 4. C. (4)) referring to information between parentheses.

(13) Test 3-17, Yaw

(a) Carry out same procedure as for test 3-09 (Ref. paragraph 4.C. (5)) referring to information between parentheses.

(14) Test 3-18.

(a) On test set control and display panel, place ORDER switch in ON position.

(b) The eight magnetic indicators on ICOVOL must display a green G.

(c) On test set control and display panel, press and release RESET push-button.

(15) Test 3-19, Roll

(a) Carry out same procedure as for test 3-07 (Ref. paragraph 4. C. (3)), referring to information between parentheses and making the following chan-

ges :

Read "roll to the left" instead of "roll to the right"
Read "turn control wheel to left" instead of "turn control wheel to right"
Read "rudders deflect to the left" instead of "rudders deflect to the right"

(16) Test 3-20, Pitch

(a) Carry out same procedure as for test 3-08 (Ref. paragraph 4.C. (4)), referring to information between parantheses and making the following change :

Read "downwards" instead of "upwards".

(17) Test 3-21, Yaw

(a) Carry out same procedure as for test 3-09 (Ref. paragraph 4.C. (5)), referring to information between parentheses and making the following change :

Read "rudders deflect to right" instead of "rudders deflect to left".

(18) Test 3-22

(a) On test set control and display panel, place ORDER switch in ON position.

(b) The eight magnetic indicators on ICOVOL must display a blue B.

(c) Disengage the three PITCH, ROLL and YAW engage switches on AUTO STAB No.2 control unit.

(d) On the two pressure sensor simulators place switches and potentiometer in following configuration :

SENSOR - SIMUL	on SIMUL
I LOCAL - I = 1°, I = 0.24°	on I = 1°, I = 0.24°
PROBE CORRECTION - LOCKED	on LOCKED
AIRSPEED	on 0kt
ALTITUDE	on 1013 mb.

(e) On ADC control panel, place the two ADC 1 and ADC 2 switches in ON position.

- Press and release ADC 1 and ADC 2 caption lights to reset.

(f) On the two pressure sensor simulators set a mach number of 0.25 for an IAS of 100 kt.

(g) Engage the two YAW engage switches on AUTO STAB No.1 and No.2 control units.

- Engage switches must hold in engaged position.

(h) On ADC control panel, place ADC 1 (ADC 2) switch in OFF position.

(h1) YAW engage switch on AUTO STAB No.1 (No.2) control unit must fall to OFF position.

(h2) Attempt to re-engage YAW engage switch on AUTO STAB No.1 (No.2) control unit.

- Engage switch must not hold in engaged position.

(i) Disengage YAW engage switch on AUTO STAB No.2 (No.1) control unit.

(j) Engage YAW engage switch on AUTO STAB No.1 (No.2) control unit.

(j1) Engage switch must hold in engaged position.

(k) Engage YAW engage switch on AUTO STAB No.2 (No.1) control unit.

(k1) YAW engage switch of AUTO STAB No.2 (No.1) control unit must hold in engaged position and YAW engage switch of AUTO STAB No.1 (No.2) control unit must fall to OFF position

(l) On ADC control panel, place ADC 1 (ADC 2) switch in ON position.

(l1) Place associated TEST selector switch in positions 1 then NORM.

(l2) Do not press ADC 1 (ADC 2) caption light to reset.

NOTE : Operations which follow (paragraphs m, n and o) must be carried out in less than 2 minutes.

(m) On pressure sensor simulator connected to ADC 1 (ADC 2), set an IAS greater than 270 kt.

(n) Engage YAW engage switch on AUTO STAB No.1 (No.2) control unit.

(n1) Engage switch must hold in engaged position.

(o) On pressure sensor simulator connected to ADC 1 (ADC 2), reduce IAS to less than 270 kt.

(o1) YAW engage switch on AUTO STAB No.1 (No.2) control unit must fall to OFF position.

(p) On ADC control panel, press and release ADC 1 (ADC 2) caption light.

(q) On AFCS control unit engage AP1 and FD1 (AP2 and FD2) engage switches (Ref. 22-10-00, Servicing).

(r) Select LAND mode, then carry out LOC beam and GLIDE beam capture.

(s) On ADC control panel, place ADC 1 (ADC 2) TEST selector switch on positions 1 then NORM.

(s1) Do not press ADC 1 (ADC 2) caption light to reset.

(t) YAW engage switch on AUTO STAB No.1 (No.2) control unit must hold in engaged position.

(u) On AFCS control unit disengage AP1 and FD1 engage switches.

(v) YAW engage switch on AUTO STAB No.1 (No.2) control unit must fall to OFF position.

(w) On ADC control panel, press and release ADC 1 (ADC 2) caption light to reset.

(x) Cancel the various warnings resulting from disconnection of systems.

(y) Engage YAW engage switch on AUTO STAB No.1 control unit then carry out same sequence of operations for yaw autostabilization axis No.2 as those described in paragraphs 4.C. (18) (h) to 4.C. (18) (x), referring to information between parentheses. Same results must be obtained.

(z) On ADC control panel place the two ADC 1 and ADC 2 switches in OFF position.

(aa) On test set control and display panel, place ORDER switch in upper position.

(ab) First place flight control switches in MECH position and BLUE INVERTER and GREEN INVERTER switches in PWR OFF position, then disconnect cables of test set and return system to condition described in 27-17-00, paragraphs 3.G. (5) and (6).

(ac) Return pressure sensor simulators to initial condition (Ref. paragraph 4.B. (6)), disconnect cables from ADC 1 and ADC 2 test connectors and install covers on connectors.

(ad) Install access panels 215ES and 216ES.

D. Measurement of Lateral Accelerometer Null Points

(1) On circuit breaker panel 2-213 (13-216), map ref. E5 (D17), trip, safety and tag circuit breaker 1C37, AUTOSTAB 1 COMP SUP (2C37, AUTOSTAB 2 COMP SUP).

(2) Remove access panel 215BS (216BS) from shelf 4-215 (4-216), then remove protective cover from test connector ZA located on front panel of azimuth computer 1C13 (2C13).

(3) Start up INS No.1 and INS No.2 by placing respective mode selector unit (MSU) switches in ALIGN position.

(a) Measure DC voltage at connector ZA between terminals 7 and 34, ground.

(b) When expressed in millivolts this must be equal to the roll angle Φ displayed on Captain's (First Officer's) ADI multiplied by 200 i.e.
$U0 = \Phi \times 200$

NOTE : A roll angle Φ greater than 0° corresponds to roll to the right, and a negative roll angle to roll to the left.

(4) On circuit breaker panel 2-213 (13-216), map ref. E5 (D17), remove safety clips and tags and reset circuit breaker 1C37 (2C37).

(5) Remove access panel 215AS (216AS) from shelf 8-215 (8-216), then remove protective covers from connectors ZA and ZB located on front panel of autostabilization computer 1C31 (2C31).

(6) Measure DC voltages U1 and U2 at connectors ZA and ZB respectively between terminals 11 and 39, ground.

(a) These voltages must be equal to each other and less than 300 plus 3.14 millivolts. When expressed in millivolts they must be equal to 300 plus 3.14 times voltage U0 previously measured in paragraph (3) (b), i.e.

$$U1 = U2 = 300 + (3.14 \times U0)$$

(7) Install protective covers on test connectors of azimuth computer 1C13 and autostabilization computer 1C31, then carry out same operations for lane 2 referring to information between brackets, from paragraph 4.D. (1) through paragraph 4.D. (6) (a). Same results must be obtained.

(8) Install protective covers on test connectors on azimuth computer 2C13 and autostabilization computer 2C31.

(9) Install access panels 215BS, 216BS, 215AS and 216AS

E. Close-Up

(1) Shut down INS No.1 and INS No.2 by placing respective MSU switches in OFF position (Ref. 34-45-00, Adjustment/Test).

(2) Remove safaty clips and tags and trip the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13- 216	X 345	G 4

(3) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(4) Remove access platforms.

END OF THIS SECTION

NEXT

AUTOSTABILIZATION COMPUTER - REMOVAL/INSTALLATION

1. General

WARNING : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

Autostabilization computers 1C 31 and 2C 31 are mounted on shelves 8-215 and 8-216 in electronics rack. Locating pins are provided on connectors so that computer replacement with a computer of a different type is made impossible.

Removal procedures for replacement of the computers are iden-
R tical, only one procedure is described.
R Only circuit breakers associated with the computer to be remo-
R ved must be tripped.

2. Computer

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.47 m (14 ft. 8 in.)	
Circuit Breaker Safety Clips	

B. Prepare

(1) For removal of computer No.1 (1C 31), trip, safety and tag the following circuit breakers :

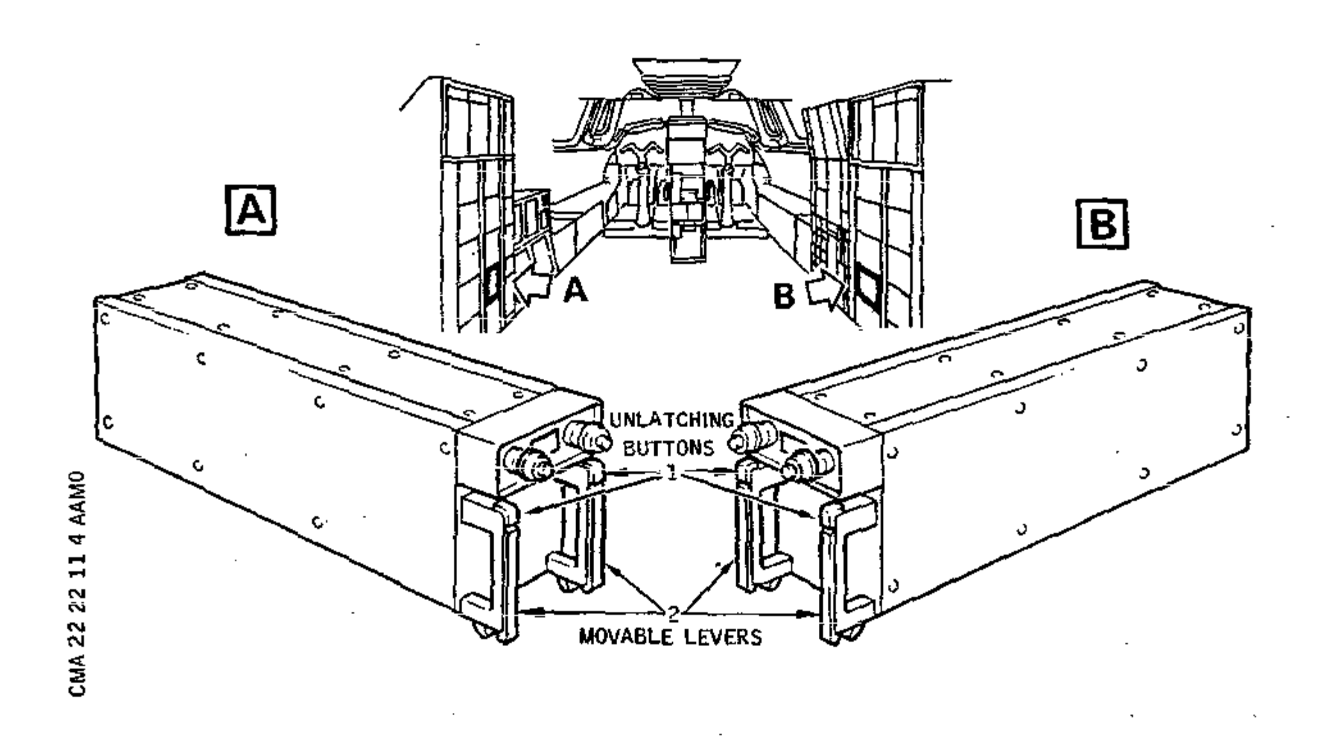
SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
PFCS INV GRN	1-213	1C 66	P11
LAT ACCELMTR 1 26V SUP	2-213	1C 42	A 4
AUTOSTAB 1 COMP SUP		1C 37	E 5
AFCS MODE SYS 1 LTS SUP	13-215	1C 273	B 5

(2) For removal of computer No.2 (2C 31) trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
PFCS INV BLUE SUP	5-213	2C 66	B14
LAT ACCELMTR 2 26 V SUP	13-216	2C 42	B16
AUTO STAB 2 COMP SUP		2C 37	D17
AFCS MODE SYS 2 LTS SUP		2C 273	E17

R (3) Remove panel 315AS to gain access to shelf 8-215 for
R removal of computer No. 1 (1C31) or panel 216AS for
R removal of computer No. 2 (2C31).

C. Remove



Location of Autostabilization Computers
Figure 401

R (1) On front face of computer, press unlatching buttons
R (1) on top of the two pulling handles.

(a) The two movable levers (2) fall.

(2) Fully lower the two movable levers.

R (3) Withdraw computer by pulling the handles.

D. Preparation of Replacement Component

R (1) Check that computer seating is clean and that rack
R connectors are in correct condition (no corrosion).

R (2) Visually check computer for correct external condition
R (no dents) and check that connectors are undamaged and
R free from traces of corrosion.

E. Install

(1) Press the two unlatching buttons.

(a) The two movable levers fall

R (2) Position computer on its rails.

R (3) Push computer fully home.

R (4) Lift the two movable levers until pawls lock into
R position.

(5) Remove safety clips and tags and reset the circuit
R breakers previously tripped.

F. Tests (Ref. 22-22-11, Adjustment/Test).

G. Close-Up

R (1) Install panel 215AS or 216AS.

R (2) Remove access platform.

AUTOSTABILIZATION COMPUTER - ADJUSTMENT/TEST

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

1. General

ATTENTION : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

This adjustment/test procedure is intended to check the proper operation of the autostabilization computers on the three pitch, roll, and yaw axes.
This test is divided up as follows :
- Check of engagement conditions
- Check of roll-yaw co-ordination

Test procedure being identical for each computer, only computer No.1 test is described, while information relating to computer No.2 is given in parentheses.
The test is carried out with the aircraft on the ground, shock absorbers compressed.

2. Operational Test

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.47 m (14 ft.8 in.)	
Electrical Ground Power Unit	

B. Prepare

(1) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
NOSE UC WEIGHT SW "A" SYS SUP	1-213	G 291	M16
LH UC WEIGHT SW "A" SYS SUP		G 292	M17
RH UC WEIGHT SW & DOWN-LOCK "A" SYS SUP		G 295	M18
AUDIO WARN SYS SUP 1		W 371	M21
MWS SUP 1		W 252	N21
ADC1 28V SUP		1F 74	P12
FLT CONT POSN IND CONT		C 83	R11
SAFETY FLT CONT No.1 SUP		1C 651	S20
LAT ACCELMTR 26V SUP	2-213	1C 42	A 4
FLT CONT POSN IND 26V 400Hz SUP		C 84	B 4
1st PLT ADC INST SUP		1F 75	B 3
AUTOSTAB 1 COMP SUP		1C 37	E 5
ADC1 115V SUP		1F 73	F 3
LH UC WEIGHT SW & DOWN-LOCK "B" SYS SUP	3-213	G 293	B 8
RH UC WEIGHT SW "B" SYS SUP		G 294	B 9
NOSE UC WEIGHT SW "B" SYS SUP		G 296	D 8
AUDIO WARN SYS SUP2	5-213	W 372	C17
MWS SUP2		W 251	D15
SAFETY FLT CONT No.2 SUP		2C 651	D17
ADC2 28V SUP		2F 74	F12
SAFETY FLT CONT COMP No.1 115V SUP	13-215	1C 652	E 6

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
SAFETY FLT CONT COMP No.1 26V SUP		1C 653	F 6
2nd PLT ADC INST SUP	13-216	2F 75	A14
LAT ACCELMTR 2 26V SUP		2C 42	B16
SAFETY FLT CONT COMP No.2 26V SUP		2C 653	C16
SAFETY FLT CONT COMP No.2 115V SUP		2C 652	C17
AUTOSTAB 2 COMP SUP		2C 37	D17
ADC2 115 V SUP		2F 73	F15

(2) Reset the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-216	X 345	G 4

(3) Trip, safety and tag the following circuit breaker :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
STICK SHAKER SUP	1-213	W 513	P15

(4) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing)

(5) At Flight Engineer's station, on EQUIPMENT BAY COOLING panel, make certain that electronics rack ventilation is operating (Ref. 21-21-00).

(6) Pressurize Blue hydraulic system (Ref. 29-12-00, Servicing) and Green hydraulic system (Ref. 29-11-00, Servicing).

(7) Set flight controls to electrical mode, and select BLUE channel (Ref. 27-00-00, Servicing).

(8) In flight compartment, on centre console

(a) On ADC control panel, make certain that ADC1 and ADC2 TEST selector switches are in NORM position.

(b) Place ADC1 (ADC2) switch in ON position.

(c) If ADC1 (ADC2) caption light illuminates, press to reset.

(d) Set the three roll, yaw and pitch control wheels to 0°.

C. Test

(1) Check of engage conditions

(a) Make certain that PITCH, ROLL and YAW engage switches on the other autostabilizer control unit are in OFF position.

(b) On flight control unit, place ANTI STALL SYSTEM No.1 (ANTI STALL SYSTEM No.2) switch in ON position.

(b1) Associated SYST FAIL caption light illuminates.

(c) On AUTOSTAB No.1 (AUTOSTAB No.2) control unit, engage PITCH engage switch.

(c1) Engage switch must remain engaged.

(c2) Associated SYST FAIL caption light must extinguish.

(c3) On ICOVOL (Flight Control Surface Position Indicator), check that there is no elevon deflection.

(d) On ADC control panel, place ADC1 (ADC2) TEST selector switch in position 1.

(d1) On AUTOSTAB No.1 (AUTOSTAB No.2) control unit, PITCH engage switch returns to OFF position.

(d2) On master warning panel, STAB red warning light must illuminate.

(d3) Single stroke gong sounds.

(d4) Associated SYST FAIL caption light must illuminate.

(e) On master warning panel, press STAB warning light in order to cancel warning.

(f) On ADC control panel, place ADC1 (ADC2) TEST selector switch in NORM position.

(g) Press ADC1 (ADC2) amber caption light, then release it (reset function).

(h) On flight control unit, place ANTI STALL No.1 (ANTI STALL No.2) switch in OFF position.

R (h1) Associated SYST FAIL caption light must extinguish.

(i) On ADC control panel, place ADC2 (ADC1) switch in ON position.

(i1) If ADC2 caption light illuminates, press to reset.

(j) On AUTOSTAB No.1 and AUTOSTAB No.2 control units,
R engage YAW engage switches.

R (j1) Both engage switches must remain engaged.

(j2) On ICOVOL, check that there is no rudder deflection.

(k) On ADC control panel, place ADC1 (ADC2) switch in OFF position.

R (k1) On AUTOSTAB No.1 (No.2) control unit, YAW
R engage switch must return to OFF.

(l) On AUTOSTAB No.2 (AUTOSTAB No.1) control unit,
R disengage yaw engage switch.

(l1) On master warning panel, STAB red warning light must illuminate.

R (l2) Single stroke gong sounds.

R (m) On master warning panel, press STAB warning light to cancel warning.

(n) On AUTOSTAB No.1 (AUTOSTAB No.2) control unit,
R engage YAW engage switch.

R (n1) Engage switch must remain engaged.

(o) On AUTOSTAB No.2 (AUTOSTAB No.1) control unit,
R engage YAW engage switch.

(o1) On AUTOSTAB No.1 (AUTOSTAB No.2) control
R unit, YAW engage switch must return to OFF.

(p) On ADC control panel

(p1) Place ADC2 (ADC1) switch in OFF position.

(p2) Place ADC1 (ADC2) switch in ON position.

- If ADC1 (ADC2) caption light illuminates, press to reset.

(q) On AUTOSTAB No.2 (AUTOSTAB No.1) control unit, disengage YAW engage switch.

(r) On master warning panel, press STAB red warning light in order to cancel warning.

(s) On AUTOSTAB No.1 (AUTOSTAB No.2) control unit, engage ROLL engage switch.

(s1) Engage switch must remain engaged.

(s2) On ICOVOL, check that there is no elevon deflection.

(t) On AUTOSTAB No.1 (AUTOSTAB No.2) control unit, disengage ROLL engage switch.

(t1) On master warning panel, STAB red warning light must illuminate.

(t2) Single stroke gong sounds.

(u) On master warning panel, press STAB warning light in order to cancel warning.

(v) On flight control unit, place O & M ELEVONS, IN. ELEVONS, and RUDDER selector switches in GREEN position.

(w) On AUTOSTAB No.1 (AUTOSTAB No.2) control unit, engage the three PITCH, ROLL and YAW engage switches.

(w1) The three engage switches must remain engaged.

(w2) Check that there is no elevon deflection.

(w3) Check that there is no rudder deflection.

(2) Testing of roll-yaw coordination

(a) On flight control unit, place O & M ELEVONS, IN. ELEVONS, and RUDDER selector switches in BLUE position.

R (a1) Press then release associated RESET buttons.

R NOTE : Movement of elevons in roll sense to
R right produces a movement of indicator
R bars on the ICOVOL :
R - Upwards for the RH elevons
R - Downwards for the LH elevons, and
R inversely for a roll movement to the
R left.

(b) On flight control unit, place ANTI STALL SYSTEM 1 (ANTISTALL SYSTEM 2) switch in ON position.

R (b1) Associated SYST FAIL caption light must extinguish.

R (c) Turn roll control wheel to the right.

R (c1) On ICOVOL, check that rudder surface indica-
R tor bars (in particular) move to the right.

R (d) Turn roll control wheel to the left.

(d1) On ICOVOL, check that the rudder surface
R indicator bars (in particular) move to the
R left.

R (e) Place roll control wheel in 0° position.

(f) On flight control unit, place O & M ELEVONS, IN. ELEVONS and RUDDER selector switches in GREEN position and repeat the procedure described from
R 2.C.(2)(b) through 2.C.(2)(e). Results must be
R the same.

(g) On flight control unit

(g1) Place ANTISTALL 1 (ANTISTALL 2) switch in OFF position.

(g2) Place O & M ELEVONS, IN.ELEVONS and RUDDER selector switches in MECH position.

(g3) Place both BLUE INVERTER and GREEN INVERTER switches in PWR OFF position.

(h) On AUTOSTAB No.1 (AUTOSTAB No.2) control unit,
R disengage the three PITCH, ROLL and YAW engage
R switches.

R (h1) On master warning panel, STAB red warning

light must illuminate.

R (h2) Single stroke gong sounds.

R (h3) Associated SYST FAIL caption light must extinguish.

R (i) On master warning panel, press STAB warning light in order to cancel warning.

(j) On ADC control panel, place ADC1 (ADC2) switch in OFF position.

R (k) Depressurize Blue hydraulic system (Ref. 29-12-00,
R Servicing) and Green hydraulic system (Ref. 29-11-00, Servicing).

(l) Remove safety clip and tag and reset the following circuit breaker :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
STICK SHAKER SUP	1-213	W 513	P15

D. Close-Up

(1) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-216	X 345	G 4

R (2) De-energize the aircraft electrical network and dis-
R connect electrical ground power unit. (Ref. 24-41-00, Servicing).

(3) Remove access platform.

1. General

CAUTION : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-20-00, SERVICING.

R Removal procedures are identical for both rate-gyros on any one
R axis, thus only the procedure relative to one rate-gyro is des-
R cribed.
R For removal/installation of lane 2 rate-gyros, refer to identi-
R fiers between parentheses.

2. Rate-Gyro - Pitch Axis
(Ref. Fig. 401)

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 3.220 m (10 ft. 7 in.)	
R Blanking Cap	
Circuit Breaker Safety Clips	

B. Prepare

(1) For rate-gyro 1C 33 (2C 33), trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AUTOSTAB 1 COMP SUP	2-213	1C 37	E 5
AUTOSTAB 2 COMP SUP	13-216	2C 37	D17

(2) For rate-gyro 1C 38 (2C 38), trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
LAT ACCLMTR 1 26 V SUP	2-213	1C 42	A 4
LAT ACCLMTR 2 26 V SUP	13-216	2C 42	B16

(3) Unlock baggage compartment access door opening mechanism (Ref. 52-31-21, Adjustment/Test - Operational Test).

(4) Open access door.

R (5) In baggage compartment, remove panel FS, zone 131 (FS zone 132)

C. Remove

(1) Disconnect connector (3) from socket (4) on rate-gyro
R (7) 1C33(2C33) and/or rate-gyro (9) 1C38(2C38).

R <u>CAUTION</u> : WAIT UNTIL RATE-GYRO SPINNER COMES TO A FULL STOP IF IT WAS ROTATING, BEFORE REMOVING THE ASSEMBLY.

(2) Cap socket (4).

R (3) Support rate-gyro (7).

(4) Remove the four mounting bolts (6); retain bolts together with washers (5)

(5) Carefully remove rate-gyro (7) together with its protective cover (1).

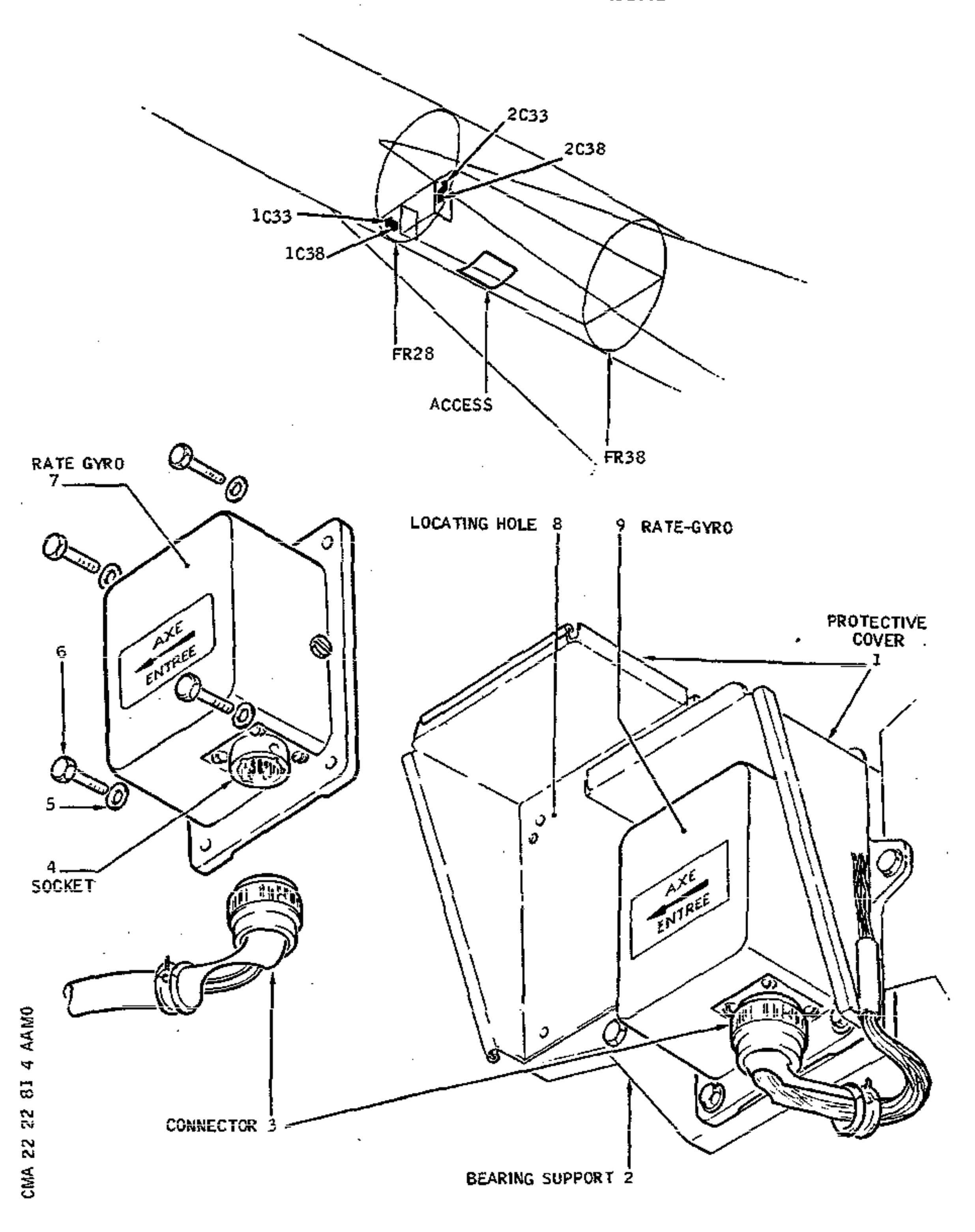
R <u>CAUTION</u> : HANDLE RATE-GYRO WITH CARE DURING TRANSPORTA-
R TION IN ORDER NOT TO DAMAGE MOVING PARTS.

D. Preparation of Replacement Component

R (1) Visually check rate-gyro and bearing support (2) for
R absence of damage and corrosion.

E. Install

R (1) Position rate-gyro (7) 1C33(2C33) and/or rate-gyro (9)
R 1C38(2C38) with its protective cover (1), with locating
R pin inserted in locating hole (8).



Pitch Axis Rate-Gyro Installation
Lane 1 Illustrated
Figure 401

R (2) While holding the assembly, install and tighten the four mounting bolts (6) fitted with washers (5).

R (3) Remove blanking cap from socket (4).

(4) Connect connector (3) to socket (4) on installed rate-gyro.

(5) Remove safety clips and tags and reset the circuit breakers previously tripped.

F. Tests

R (Ref. 22-22-00, Adjustment/Test, ITEM procedure, paragraph 2 C (2)).

G. Close-Up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2) Position and secure panel FS, zone 131 (FS, zone 132)

(3) Close and lock baggage compartment access door.

(4) Remove access platform.

3. Rate-Gyro - Yaw Axis
(Ref. Fig. 402)

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 3.220 m (10 ft. 7 in.)	
R Blanking Cap	
Circuit Breaker Safety Clips	

B. Prepare

(1) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AUTOSTAB 1 COMP SUP	2-213	1C 37	E 5
AUTOSTAB 2 COMP SUP	13-216	2C 37	D17

(2) Unlock baggage compartment access door opening mechanism (Ref. 52-31-21, Adjustment/Test - Operational Test).

(3) Open access door.

(4) In baggage compartment, remove central panel WS at frame 38.

C. Remove

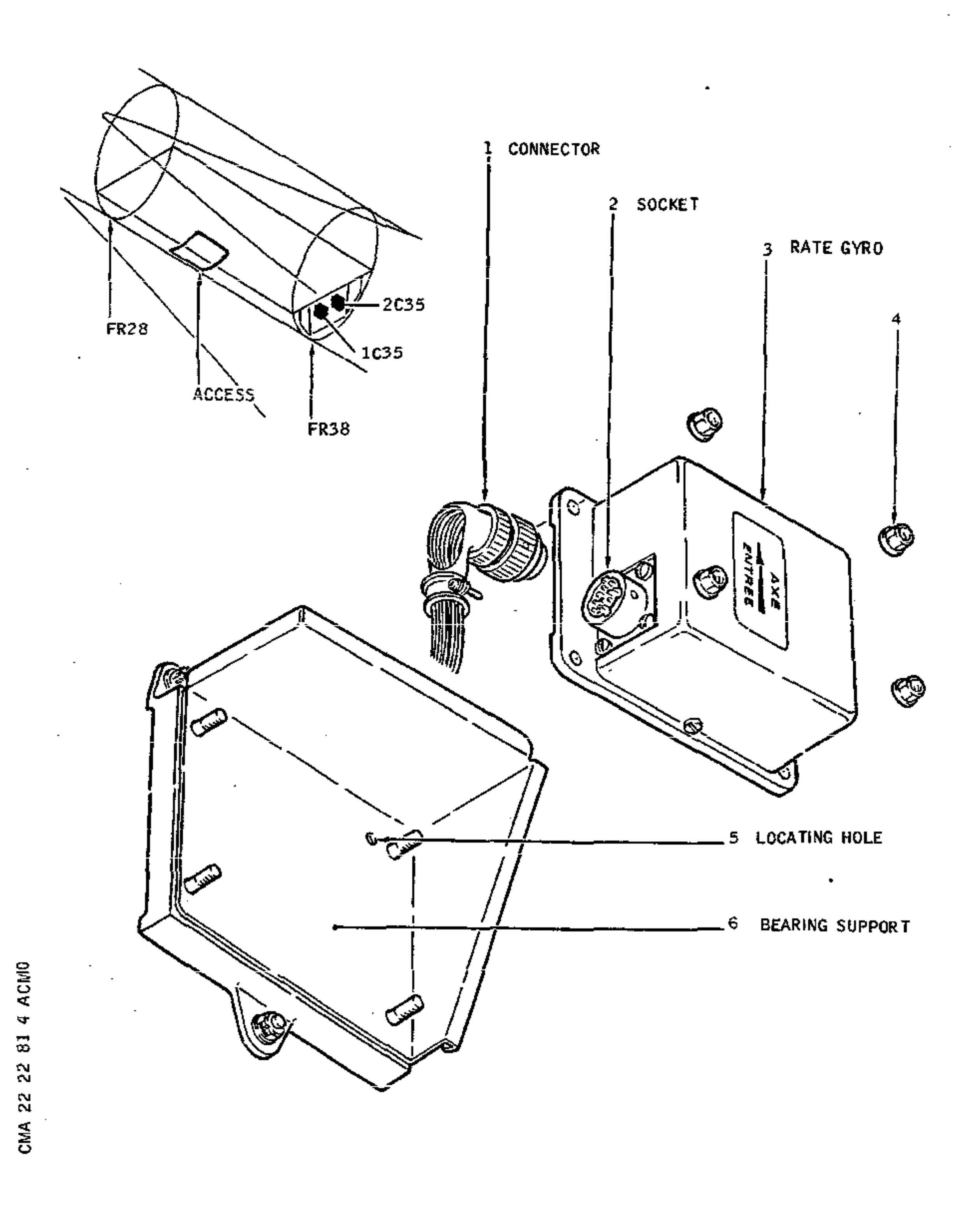
(1) Disconnect connector (1) from socket (2) on rate-gyro (3) 1C35(2C35).

R CAUTION : WAIT UNTIL RATE-GYRO SPINNER COMES TO A FULL
R STOP, IF IT WAS ROTATING, BEFORE REMOVING THE ASSEMBLY.

(2) Cap socket (2).

R (3) Support rate-gyro unit (3).

(4) Remove the four locking nuts (4) fitted with captive



Yaw Axis Rate-Gyro Installation
Lane 1 Illustrated
Figure 402

R

washers and retain them.

(5) Carefully remove rate-gyro (3).

R CAUTION : HANDLE RATE-GYRO WITH CARE DURING TRANSPORTA-
R TION IN ORDER NOT TO DAMAGE MOVING PARTS.

D. Preparation of Replacement Component

R (1) Visually check rate-gyro and bearing support (6) for
R absence of damage and corrosion.

E. Install

R (1) Position rate-gyro (3) 1C35(2C35) with locating pin inserted in locating hole (5).

(2) Install and tighten the four locking nuts (4) fitted with captive washers.

R (3) Remove blanking cap from socket (2).

R (4) Connect connector (1) to socket (2) on installed rate-gyro.

(5) Remove safety clips and tags and reset the circuit breakers previously tripped.

F. Tests

(Ref. 22-22-00, Adjustment/Test, ITEM procedure, paragraph 2 C (2)).

G. Close-Up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2) Position and secure panel WS at frame 38.

R (3) Close and lock baggage compartment access door.

(4) Remove access platform.

4. Rate-Gyro - Roll Axis
(Ref. Fig. 403)

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.470 m (14 ft. 8 in.)	
R Blanking Cap	
Circuit Breaker Safety Clips	
Lockwire	

B. Prepare

(1) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AUTOSTAB 1 COMP SUP	2-213	1C 37	E 5
AUTOSTAB 2 COMP SUP	13-216	2C 37	D17

(2) In passenger compartment, remove floor panel 241JF

C. Remove

(1) Disconnect connector (5) from socket (2) on rate-gyro (1) 1C34(2C34)

R CAUTION : WAIT UNTIL RATE-GYRO SPINNER COMES TO A FULL
R STOP, IF IT WAS ROTATING, BEFORE REMOVING THE ASSEMBLY.

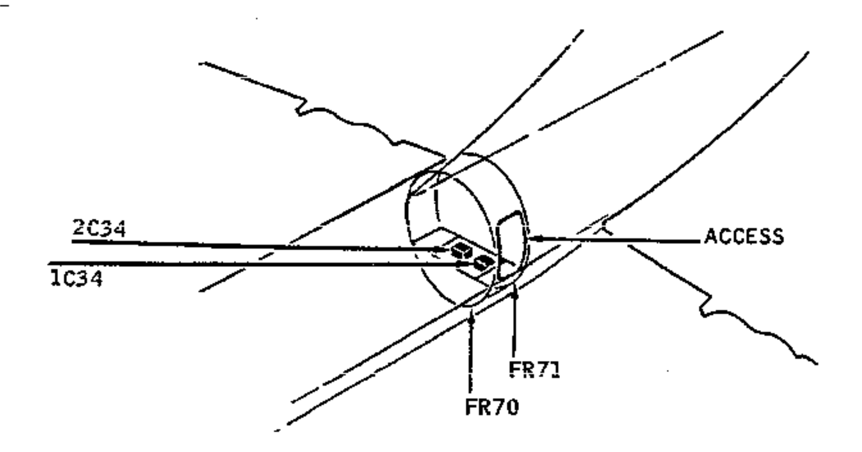
(2) Cap socket (2).

(3) Cut and remove lockwire from mounting bolts (7)

(4) Remove the four mounting bolts (7), retain them together with washers (6).

(5) Carefully remove rate-gyro (2)

CAUTION : HANDLE RATE-GYRO WITH CARE DURING TRANSPORT-



1 RATE-GYRO
7
6
2 SOCKET
5 CONNECTOR
3 LOCATING HOLE
4 BEARING SUPPORT
AXE ENTREE

CMA 22 22 81 4 AEMO

Roll Axis Rate-Gyro Installation
Lane 1 Illustrated
Figure 403

R

R ATION IN ORDER NOT TO DAMAGE MOVING PARTS.

D. Preparation of Replacement Component

R (1) Visually check rate-gyro and bearing support (4) for
R absence of damage and corrosion.

E. Install

R (1) Position rate-gyro (1) 1C34(2C34) with locating pin inserted in locating hole (3).

(2) Insert and tighten the four mounting bolts (7) fitted with washers (6).

(3) Lockwire the four mounting bolts (7) in pairs.

R (4) Remove blanking caps from socket (2).

(5) Connect connector (5) to socket (2) on installed rate-gyro.

(6) Remove safety clips and tags and reset the circuit breakers previously tripped.

F. Tests

(Ref. 22-22-00, Adjustment/Test, ITEM procedure, paragraph 2 C (3)).

G. Close-Up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2) In passenger compartment, position and secure floor panel 241JF.

(3) Remove access platform.

LATERAL ACCELEROMETER - REMOVAL/INSTALLATION

1. General

R CAUTION : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

Removal procedures are identical for both accelerometers, thus only one procedure is described. It should be recalled that ac-
R celerometer 1C36 associated with lane 1 is located on the LH side of the aircraft centreline ; accelerometer 2C36 associated
R with lane 2 is located on the RH side of the centreline.

2. Accelerometer

A. Equipment and Material

DESCRIPTION	PART NO.
Access Platform 4.470 m (14 ft. 8 in.)	
R Blanking Caps	
Circuit Breaker Safety Clips	

B. Prepare

(1) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
LAT ACCELMTR 2 26 V SUP	13-216	2C 42	B16

(2) In passenger compartment, remove floor panels 231HF and 231GF.

C. Remove

(1) Disconnect connector (3) from socket (2) on accelerometer (1).

(2) Cap socket (2).

(3) Remove the four mounting screws (8).

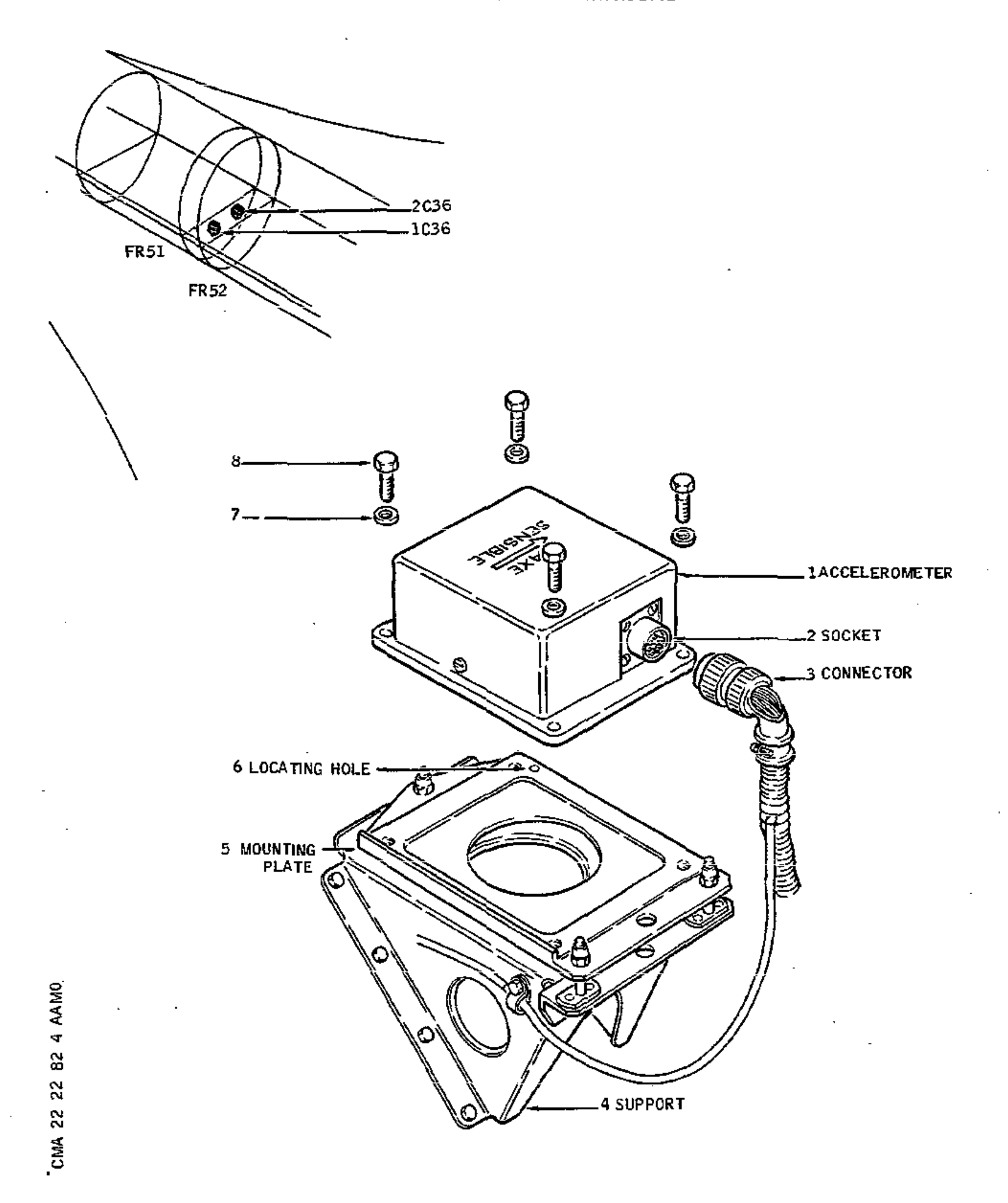
(4) Retain the four washers (7).

(5) Carefully remove accelerometer (1) from mounting plate (5).

CAUTION : HANDLE THE ACCELEROMETER WITH CARE DURING TRANSPORTATION IN ORDER TO AVOID DAMAGING
R MOVING PARTS. DO NOT PLACE ANY OBJECT ON THE MOUNTING PLATE.

D. Preparation of Replacement Component

R (1) Visually check accelerometer, mounting plate (5) and
R support (4) for absence of corrosion and damage.



R

Lateral Accelerometer Installation
Figure 401

E. Install

(1) Carefully position accelerometer (1) on mounting
R plate (5) with locating pin inserted in locating hole.

(2) Tighten the four mounting screws (8) together with their washers (7).

(3) Remove blanking cap from socket (2).

(4) Connect connector (3) to socket (2) on accelerometer (1).

(5) Remove safety clips and tags, and reset the circuit breakers previously tripped.

F. Tests

R (Ref. 22-22-00, Adjustment/Test, Operational Test, ITEM procedure, paragraph 2.C.(1)(a)).

G. Close-Up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

R (2) Install and secure floor panels 231HF and 231GF.

(3) Remove access platform.

ELECTRIC TRIM - DESCRIPTION AND OPERATION

1. General

The aircraft is equipped about the three axes with a manually controlled mechanical trim (Ref. 27-13-00, 27-23-00, 27-33-00 Description and Operation). Only the pitch axis is fitted with an electric trim either directly controlled by the pilot or automatically controlled. This system cancels efforts on the control column by moving the neutral point of the artificial feel system.

Trim control can be carried out by the Captain or the First Officer either mechanically using the trim control wheel or by use of a thumb switch on each control column handwheel. This control is inhibited when the autopilot (AP) is engaged.

Whether the autopilot is engaged or not, the trim system is slaved to the variations of mach, angle-of-attack and indicated airspeed and also to the variation of the difference between the IAS and Maximum Operating Speed (VMO). These various data, known as stabilization functions, are supplied by the ADC's.

For safety and reliability purposes, the electric trim is constituted of two identical lanes, each consisting of one control and one monitoring channel.

In normal operation, both TRIM 1 and TRIM 2 lanes are engaged ;
R lane 1 is active and has priority over lane 2 which is in stand-by mode and synchronized with the former.

By means of the Integrated Test and Maintenance system (ITEM) fitted in the aircraft, the electric trim system can be checked on the ground and monitored in flight.

- On the ground, the ITEM tests the monitoring and analog computation circuits of the system.
- In flight, the ITEM performs continuous monitoring of the signals issued by the system safety devices.

Any trim actuation, in manual or automatic operation, is indicated by the trim control wheel rotation associated with a rattle aural signal.

The electric trim is no longer connected to the warning and landing display unit as in the approach configuration, (below 100 feet) the loss of both trims does not cause AP disconnection.

In all cases, the mechanical trim can override the electric

trim.

A warning device is provided to indicate failure of the system.

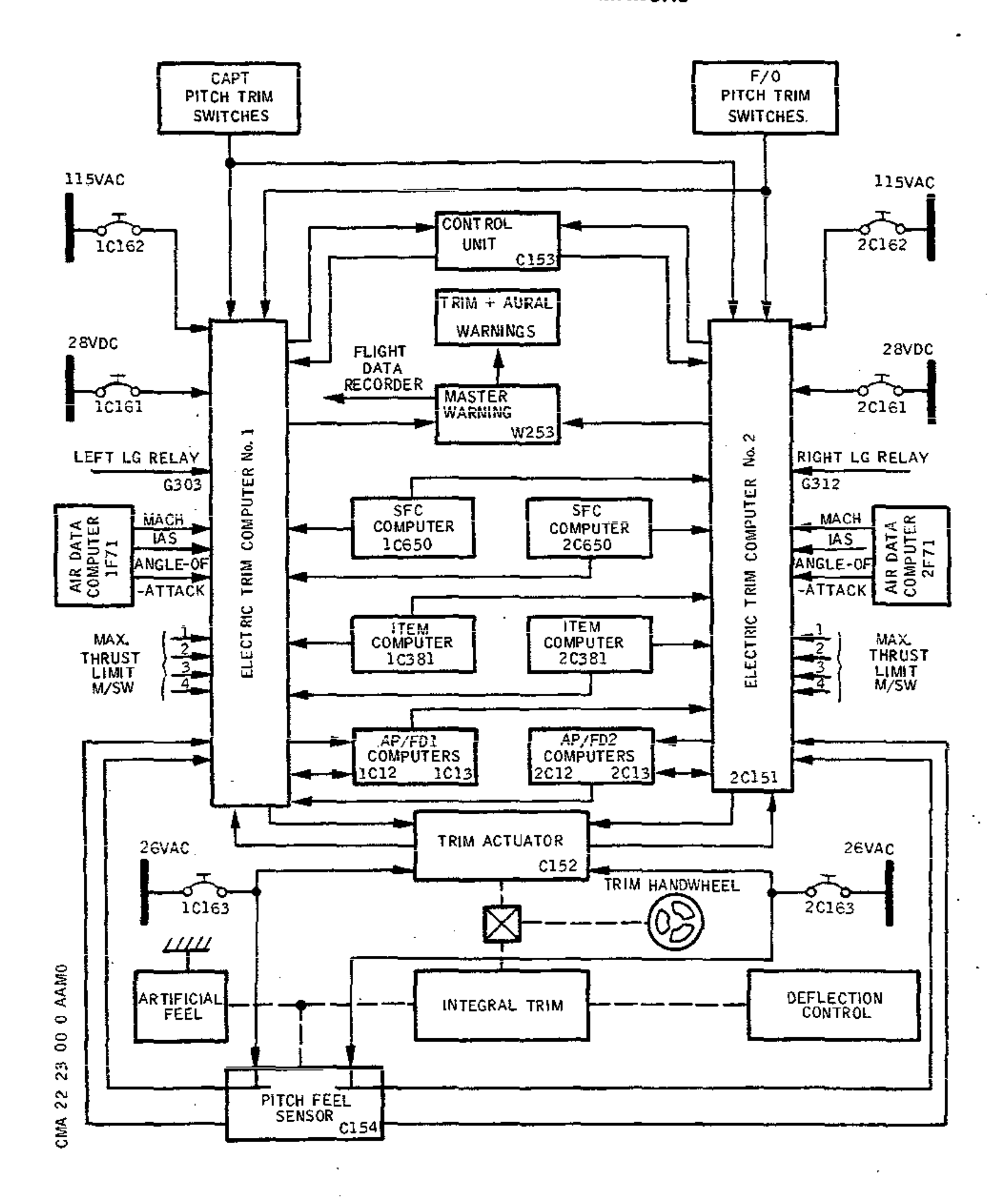
2. Description
(Ref. Fig. 001)

The electric trim main components are the following :

- One ELECTRIC TRIM control unit (C153) with 2 engage switches (1 and 2) located on the ceiling panel (Ref. 22-21-00, Description and Operation).
- Two computers (1C151 and 2C151) located respectively on electronic rack shelves 4-215 and 4-216.
- One trim actuator (C152) located under the floor between frames 3 and 4.
- One pitch feel sensor (C154) located under the floor between frames 3 and 4.
- Two PITCH TRIM UP/DOWN switches, each provided with duplicate contacts, located respectively on the Captain's and First
R Officer's control column handwheels.

Moreover, each trim computer is linked :

- to the associated air data computer (ADC), for potentiometer data on stabilization functions. (Ref. 34-11-00, Description and Operation)
R - to the safety flight control computer (Ref. 27-39-00, Description and Operation) for processing the autotrim inhibition signal in anti high angle of attack function.
- to the AP/FD pitch computer (Ref. 22-12-00, Description and
R Operation) for autotrim function, GLIDE SLOPE capture phase and system engagement condition.
- To the AP/FD azimuth computer (Ref. 22-13-00, Description and Operation) for Turbulence mode.
- to the master warning panel (Ref. 33-15-00, Description and Operation)
- to the flight data recorder (Ref. 31-31-00, Description and Operation)
- to the ITEM system (Ref.22-42-00, Description and Operation)
- to the throttle maximum thrust limit microswitches (Safety feature during take-off)
- to the two main landing gear microswitches (safety feature during take-off).



R

Electric Trim Block Diagram
Figure 001

3. Computer
(Ref. Fig. 002, 003 and 004)
(Ref. Fig. 005, 006 and 007)

R A. Description

R The electric trim computer is contained in a case.

R On the front panel are mounted two sockets (control and
R monitoring) used for testing and trouble-shooting of the
R computer, an elapsed time indicator and two transportation
handles.

R On the rear panel there are two rack connectors ; they are
R used for connection to the aircraft electrical network for
R routing the control and monitoring signals.

R B. Computer Components

R Each computer comprises :

R - analog computation circuits.
R - logic circuits.
R - an internal power supply (power supply unit).
R - internal test circuits.

R (1) Analog computation circuits

R These circuits consist of one control and one moni-
R toring channel. The analog control circuits are located
R in the RH front compartment, those for monitoring in
R the LH front compartment.

These circuits generate a trim rotation by means of input voltages associated with stabilization functions, and position differences caused by the synchronization of pilot or feel sensor demand.

Both channels are compared to each other at several points by means of duplicate comparators which issue validity signals to the logic circuits.

R (2) Logic circuits

R As with the analog computation circuits, these consist of two channels, one for control, the other for monitoring. They are located in the rear compartment section ; the RH side houses the control circuits, the LH side the monitoring circuits.

R They permit engagement of the system by monitoring ana-

TACHO GENERATOR H C
FOLLOW-UP 1 H C
FOLLOW-UP 2 H C

IAS-VMO
DIFFERENTIAL AMPLIFIER
TEST
THRESHOLD 5KTS
GAIN ADJUST
KVMO
0 1.15 2 2.5 M
8.2 V 400HZ
IAS POT No. 18
FILTER ζ= 0.1 SEC
ATTENUATOR
TURB NORM
TURB
TEST MACH NUMBER
POT No. 5
MACH NUMBER
TEST
DEMOD
TEST
∝ POT No.3
0V
DEMOD
FTCM
TEST
M POT No.3
TEST
DEMOD
DEMOD -2.5
TEST
+15V
LOGIC TEST
COMP. C1
LOGIC TEST
COMP. C2
LOGIC TEST
COMP. C3
SYNCHRO
NORM SYNC
LOGIC TEST
COMP. C4
TURB
NORM TURB
ADC

PITCH FEEL SENSOR (C)
CONTROL (C)
MONITOR (M)
PITCH FEEL SENSOR (M)

TO CONTROL CHANNEL
IAS-VMO
+
+
M
∝
MACH NUMBER
IAS
POT No.4
POT No.4
POT No.6
POT No.19
ADC
TO DEMOD PITCH FEEL SENSOR
TO COMP. M1
FROM AUTOTRIM (M)
TO COMP. M1
FROM FTCM (M)
TO COMP. M2
TO COMP. M3
TO COMP. M4
TO COMP. M4
SIMILAR TO CONTROL CHANNEL
TO COMP. M3
FTCM (M) OUTPUT

TEST
DEMOD -1.5
TEST
DEMOD -1.5
SYNCHRO
TRIM UP
TEST
TEST
AUTOTRIM
SUMM. CIRCUIT
TRIM DWN
PILOT TRIM
LIMITER
TEST
PRE-CONTROL
INHIBIT
DIGITAL INTEGRATOR
RESET
TRIM SYNCHRO
AUTOTRIM ENGAGED
TURB ENGAGED
TEST

TEST
DEMOD
LOGIC
TEST
COMP. C5
LOGIC
TEST
COMP. C6
LOGIC
COMP. C7
LOGIC
COMP. C8
LEVEL DETECTOR
TO TAKE OFF MONITORING
LEVEL DETECTOR
SUMM. CIRCUIT
D.C. PREAMPLI.

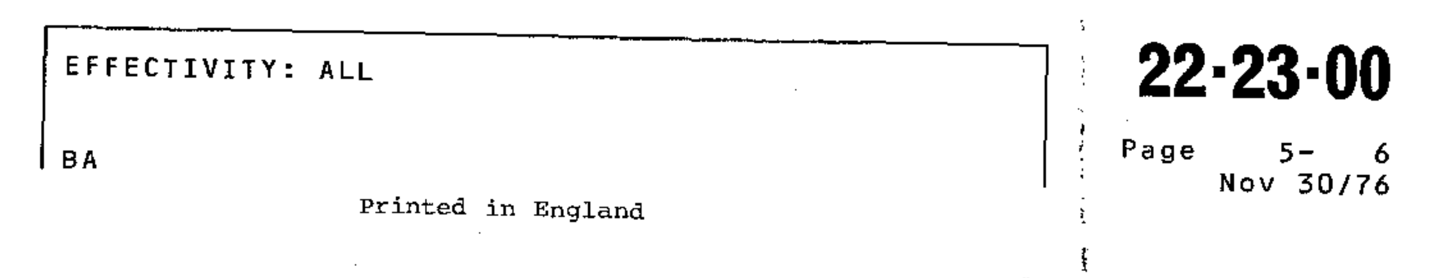
INVERTER
LIMITER
TEST
ANALOG INTEGRATOR
TEST
SUMM. CIRCUIT
AUTO TRIM
TEST
TURB ENGAGED

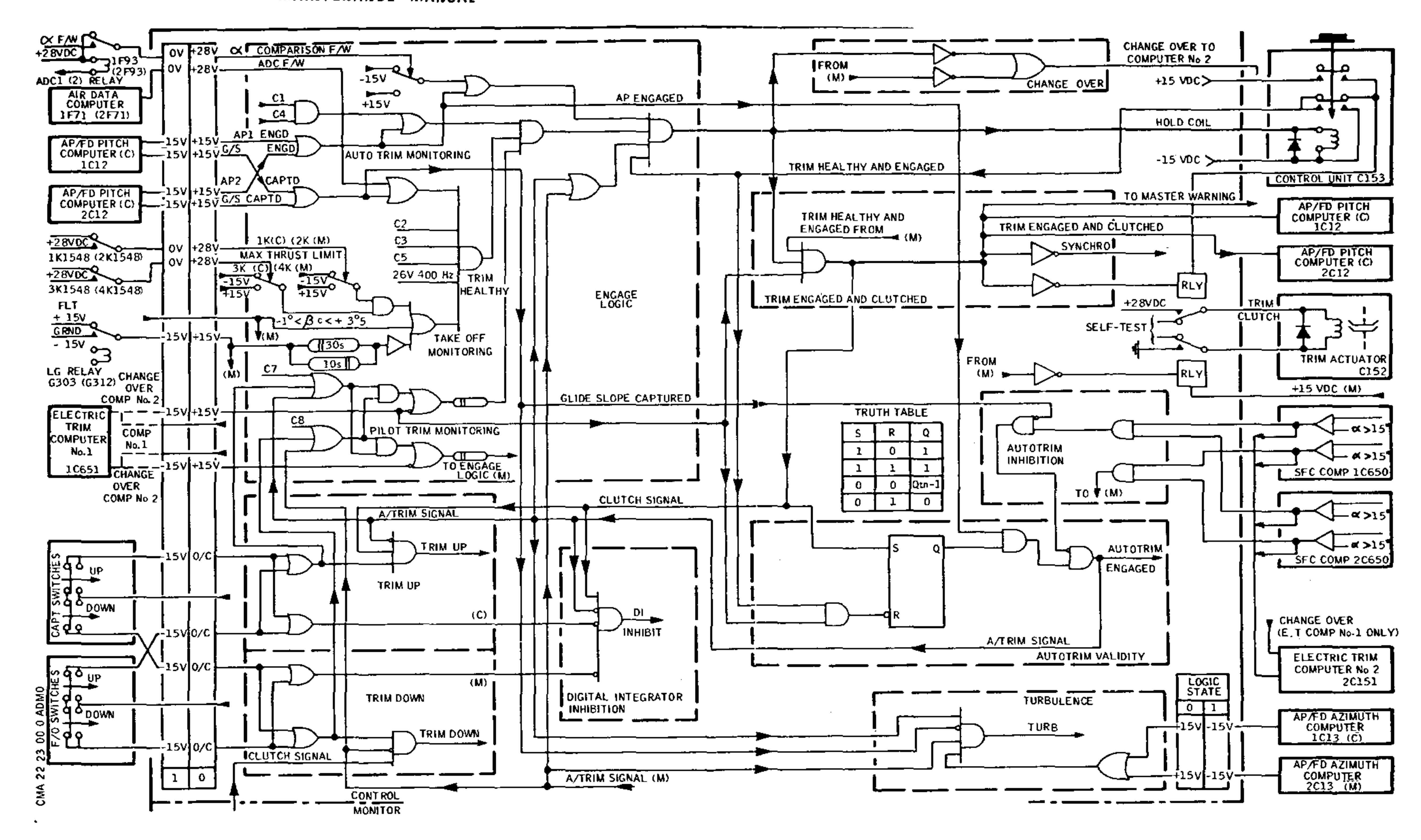
D.C. POWER AMPLIFIER
MOTOR CONTROL
MOTOR EARTH
TRIM ACTUATOR

CMA 22 23 00 0 ACMO

R

Analog Block Diagram
Figure 002





S	R	Q
1	0	1
1	1	1
0	0	Qtn-1
0	1	0

R

Logic Block Diagram
Figure 003

R log function (comparators) and data associated with peripheral systems.

They determine the various modes of trim operation (synchronization, pilot trim, autotrim).

R (3) Internal power supply

R Each computer is connected to the 115 VAC - 400 Hz and
R the 26 VAC - 400 Hz power supplies via the pitch feel
R sensor and 28 VDC power supply.

The power supply unit provides :

(a) Externally :

(a1) The + 15 VDC and - 15 VDC control and moni-
R toring voltages intended for ELECTRIC TRIM control unit.

R (a2) The - 15VDC control and monitoring voltage
R intended for Captain's and First Officer's PITCH TRIM UP/DOWN switches.

R (a3) The 8.2 volt RMS voltage (obtained from the 26 VAC - 400 Hz intended for the supply of
R potentiometers comprised in the ADC - Mach
R trim, incidence trim and IAS trim).

R (b) Internally

R (b1) The + 15 VDC and - 15 VDC control and moni-
R toring voltages for supply of analog computation circuits.

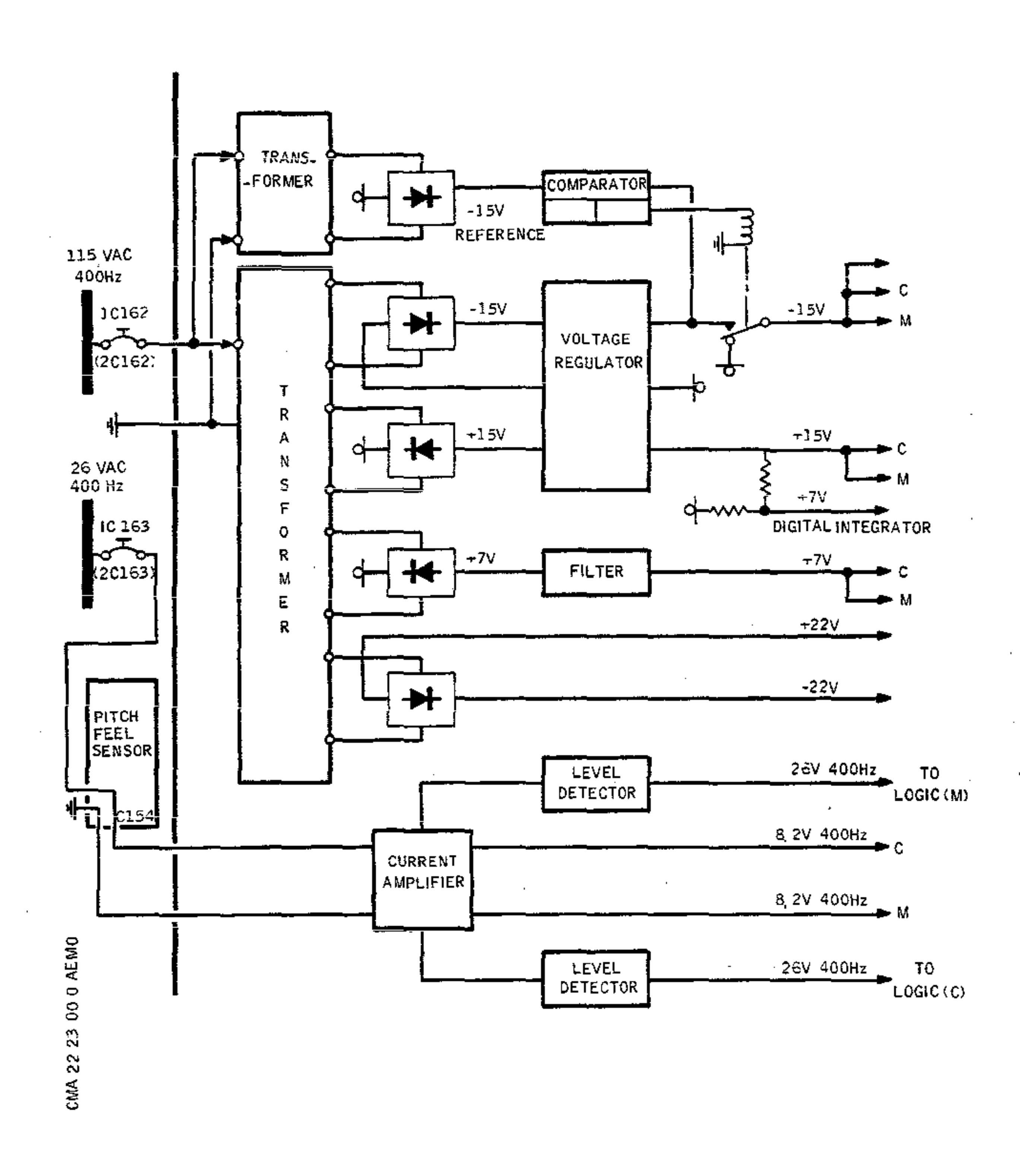
R (b2) The + 7 VDC control and monitoring voltage
R for supply of logic computation circuits.

R (b3) The + 7 VDC voltage for the digital integrator.

R (b4) The + 22 VDC and - 22 VDC voltages for supply
R of the power amplifier associated with the trim actuator.

The 28 VDC aircraft power supply is provided for
R lane 1 and lane 2 trim actuator electro-magnetic
R clutching through appropriate logic.

(4) Internal test circuits



R

Power Supply Block Diagram
Figure 004

The internal test circuits in each computer are used for testing the comparators as well as the analog channels. These circuits are activated by means of sequential binary signals generated by the ITEM.

C. Operation

(1) Synchronization

Both engage switches are in the OFF position. The logic indicates that the system is in the synchronization mode. The PITCH TRIM switches are ineffective.

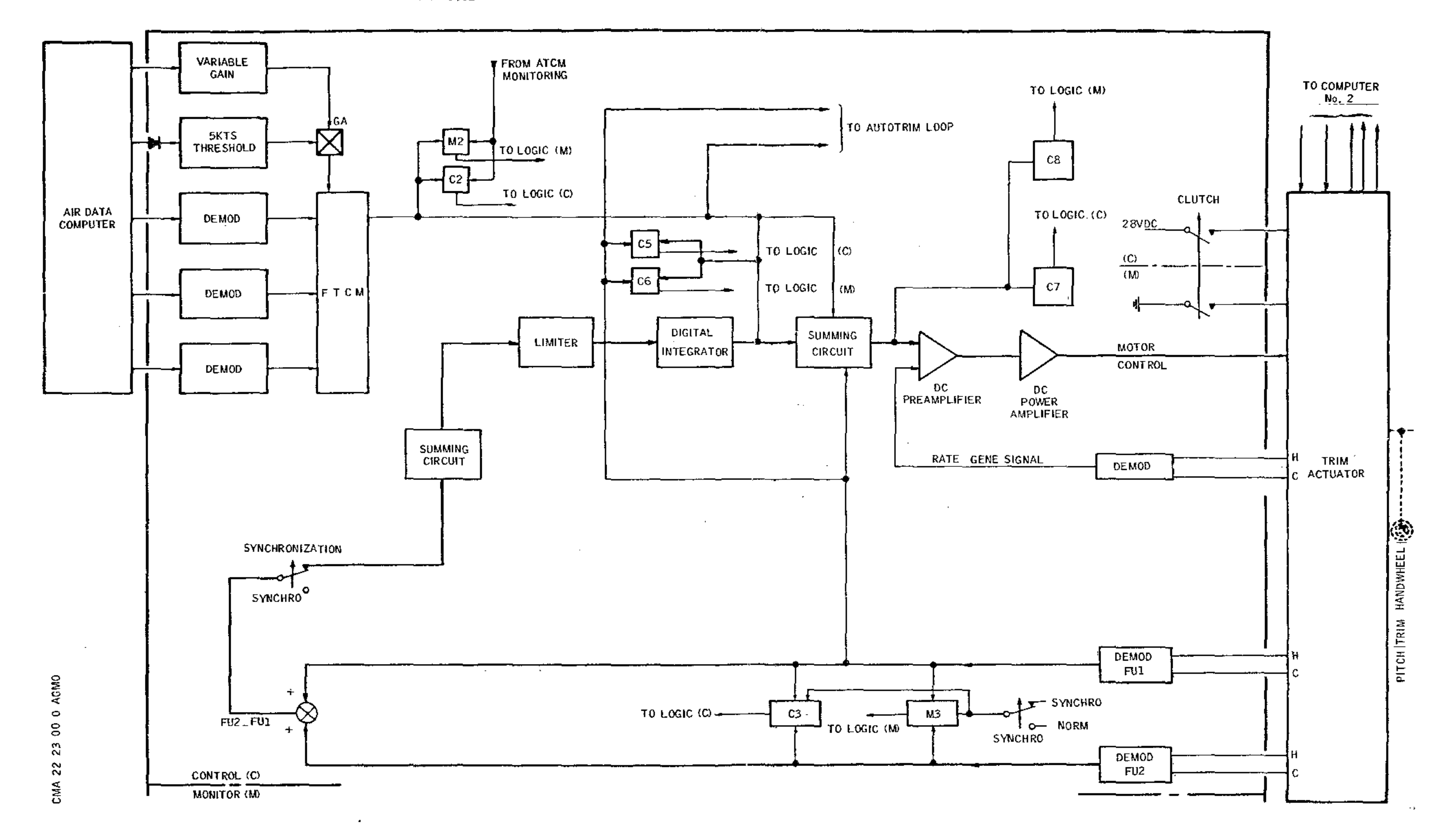
The electro-magnetic clutch of the motor is not engaged. The demodulated signals from FU1 and FU2 (follow up) synchros are of opposite sign. Comparators C3 and M3 monitor the integrity of the demodulators and also the synchronization between the two follow-up synchros. Output voltages from FU1 and FU2 comparators are transmitted to a comparator which determines the difference between the positions of the output shaft of each of the two electric motors (lane 1 and lane 2) and the trim actuator output shaft position. The resulting signal, after passing through a limiter, is transmitted to a digital integrator, the output slope of which determines the maximum speed within the mode involved. The signal which is issued to the pre-amplifier represents the difference between the FU1 position (actuator non-clutched) and the position demanded, in other words, Digital Integrator + Full Time Command Modifier (DI + FTCM). After power amplification, this signal initiates motor rotation (lanes 1 and 2) in order to align FU1 with respect to FU2 (FU2 - FU1 = 0).

When trim is manually controlled by means of the control wheel, the synchronization enables the manual order to be followed by the electric motors (synchronization rate : 0.87° elevon deflection/second).

(2) Pilot trim

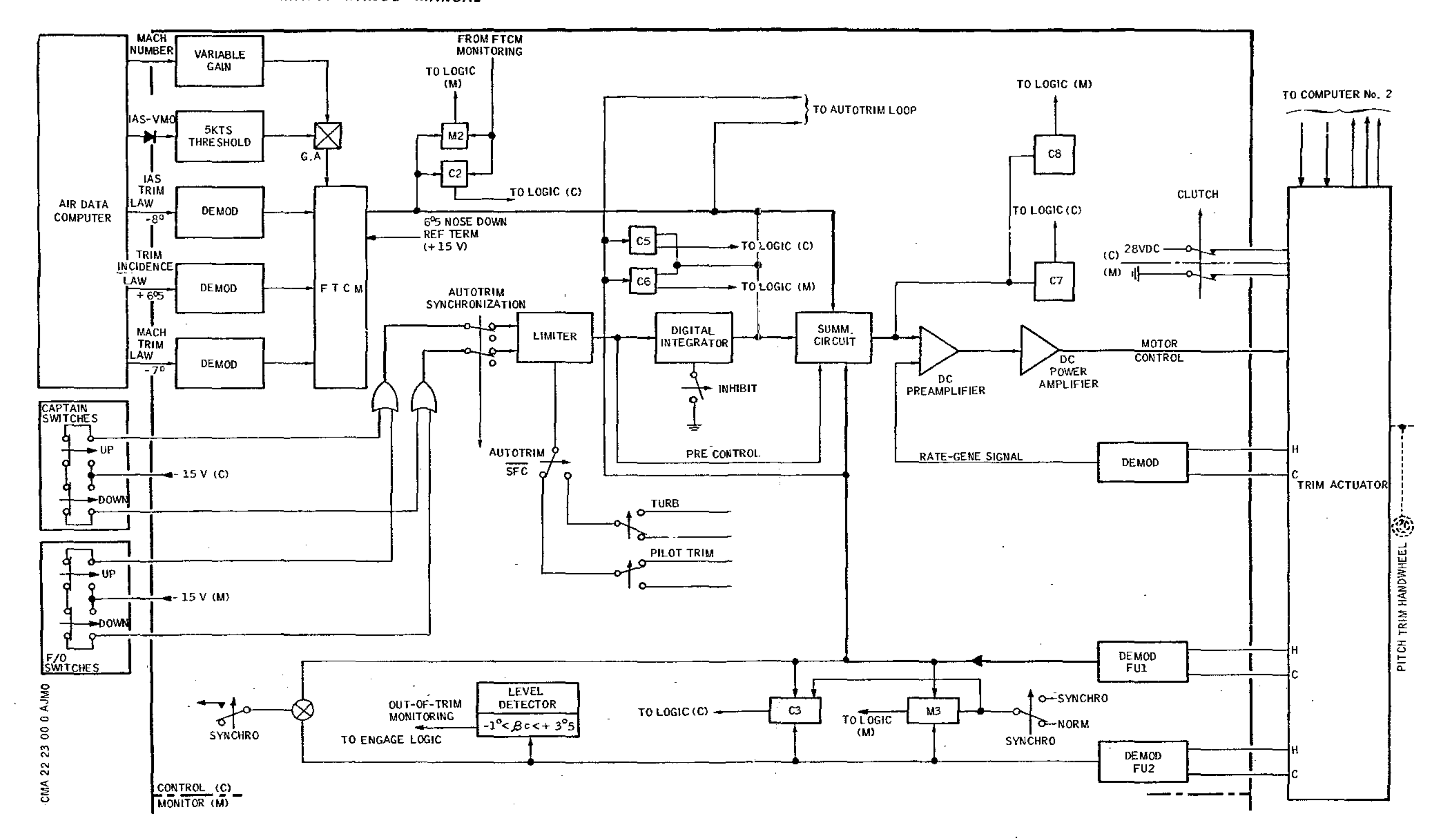
The engage switches must be placed in the ON position. The engage logic monitors the condition of the comparators and that of certain external components. If the logic does not detect any defect, the trim is correct and remains engaged. The electro-magnetic clutch of the lane which has priority is connected. If the synchro-transmitters are not yet synchronized for a few seconds there may be a transient condition in which the clutch is not engaged while the switches remain engaged.

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R

Trim Synchronization
Figure 005



R

PILOT TRIM Analog Operation
Figure 006

Operation of the PITCH TRIM UP/DOWN switches in UP or DOWN direction results in a voltage being fed into a limiter then a digital integrator. The limiter issues a voltage which varies according to the mode engaged to the digital integrator ; the level of this voltage predetermines the output slope of the integrator. The digital integrator output voltage is proportional to the duration of action on the switches and remains at the value reached at the end of the order.

The servo-loop "repeats" the slope obtained. When no order is present, a D.I. INHIBIT logic signal blocks the digital integrator (elevon deflection rate : 0.51°/sec.).

The signal sent to the preamplifier represents the difference between FU1 position (actuator clutched) and the position ordered, i.e. DI + FTCM. The pre-control signal is provided with a phase advance with respect to the signal generated by the digital integrator. This signal overrides that from the FTCM at the beginning of pilot's action on PITCH TRIM switches provided that the signal issued by the FTCM is of opposite sign to that of the electrical command signal. A RATE GENE signal from the tachometer generator is sent to the pre-amplifier in order to provide a damping term. The sign of this demodulated signal depends on the rotation sense of the motor. Furthermore, two comparators, C5 and C6, check that the difference between FTCM + D1 and FU1 is of low amplitude.

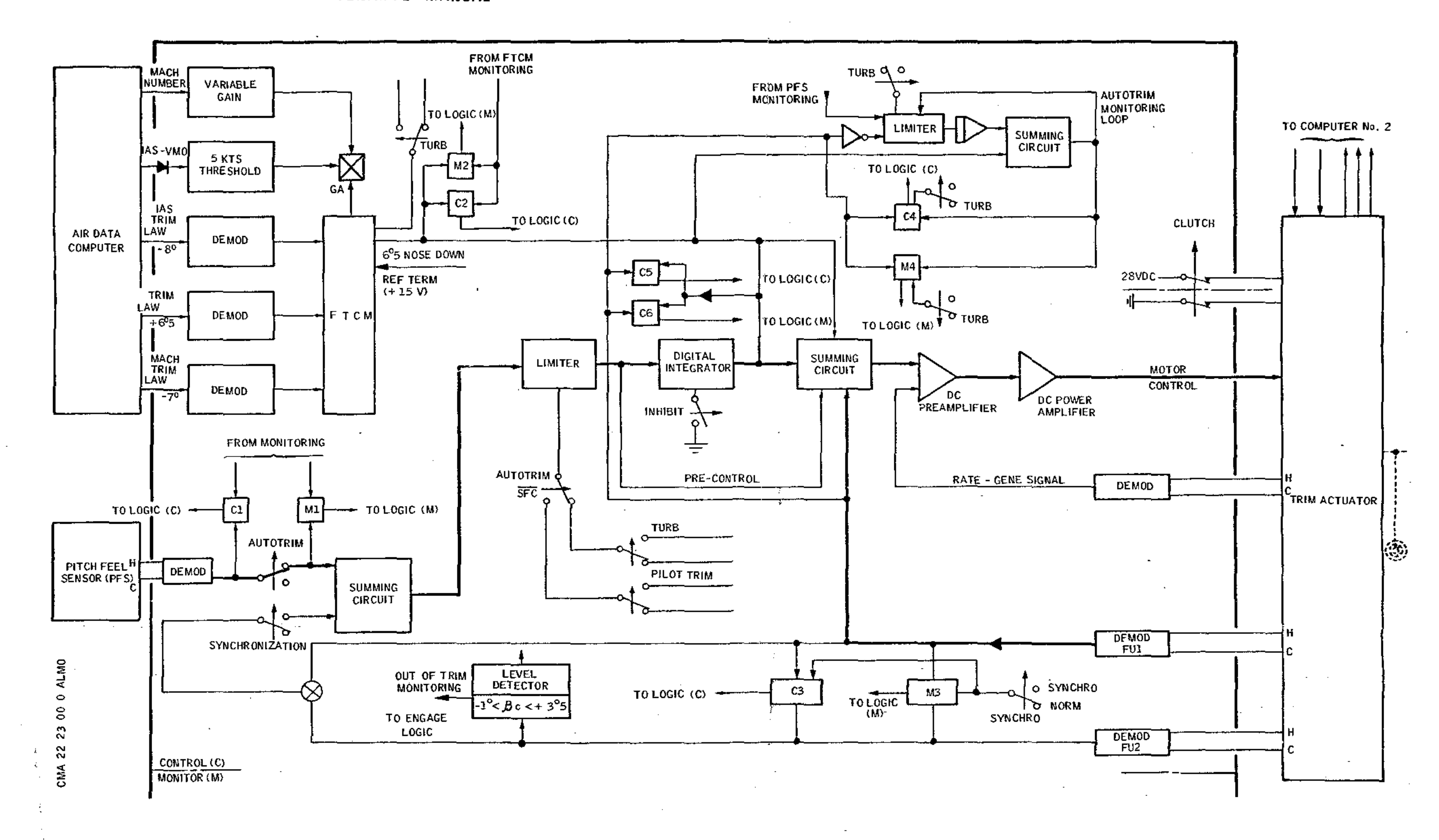
The FTCM limits the stabilization functions to the maximum useful value. These stabilization functions directly control the servo-loop. However, in order that the sum of the deflections caused by Mach trim, IAS trim and IAS - VMO does not cause saturation of the electric trim digital integrator, a 6.5° nose-down reference term is constantly applied in the FTCM. This reference term does not affect the electric trim normal operation but only shifts the digital integrator's zero. (FTCM elevon deflection rate : 0.32°/sec).

The pilot trim rotation speed being greater than that of the stabilization trim, the pilot may override at any time the stabilization functions.

(3) Autotrim

When the autopilot is engaged, the trim system becomes fully automatic and switches to autotrim function. The "one trim engaged" condition is required to enable

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R

AUTO TRIM Analog Operation
Figure 007

the automatic pilot to be engaged. When this occurs, the PITCH TRIM switches become ineffective.

R The pitch feel sensor generates a voltage proportional to the "out-of-trim" difference via synchros linked in pairs, i.e. the difference between the position of the control column driven by the automatic pilot and the trimmed position. In the same manner as in the pilot trim function, the trim actuator rotates to cancel this difference (elevon deflection rate 0.42°/sec.).
When the output voltage from the pitch feel sensor demodulator is equal to zero, the output slope from the digital integrator is equal to zero.

R The autotrim monitor loop computation channel generates a signal which is identical with the actuator follow up position (FU1 demodulated signal). Auto trim operation does not require any memory stage, therefore this signal is generated by an analog integrator. The transfer function of this channel is identical with that of the actuator amplifier stage as far as FU1 signal is concerned.
This channel monitors the output slope of the digital integrator.

R The stabilization functions generated by the FTCM are "repeated" with a speed lower than that of the autotrim. These functions provide an immediate action when the autopilot is disengaged.

R R R R R In TURBULENCE mode, as the AP authority is limited so is that of the autotrim ; autotrim authority is limited by a reduction in autotrim rate and FTCM (control and monitoring) signals. The autotrim rate must be higher than the FTCM signals rate.
Elevon deflection rate (FTCM in TURB mode) 0.16°/sec.
Elevon deflection rate (AUTOTRIM in TURB mode) 0.26°/sec.

Summary of Speeds

FUNCTIONS	COMPUTER	ELEVONS
SYNCHRONIZATION	370 mv/sec	0.87°/sec
PILOT TRIM	220 mv/sec	0.51°/sec
AUTOTRIM	180 mv/sec	0.42°/sec
AUTOTRIM - TURB	122 mv/sec	0.26°/sec
STABILIZATION TRIM	140 mv/sec	0.32°/sec
STABILIZATION TRIM-TURB	70 mv/sec	0.16°/sec

4. Actuator - Trim
(Ref. Fig. 008)

A. Description

The trim actuator is contained in a housing. Two electrical sockets with locating pins on the LH side cover enable the two trim lanes to be connected to the trim actuator.

Internally the trim actuator comprises two identical drive mechanisms. Each consists of

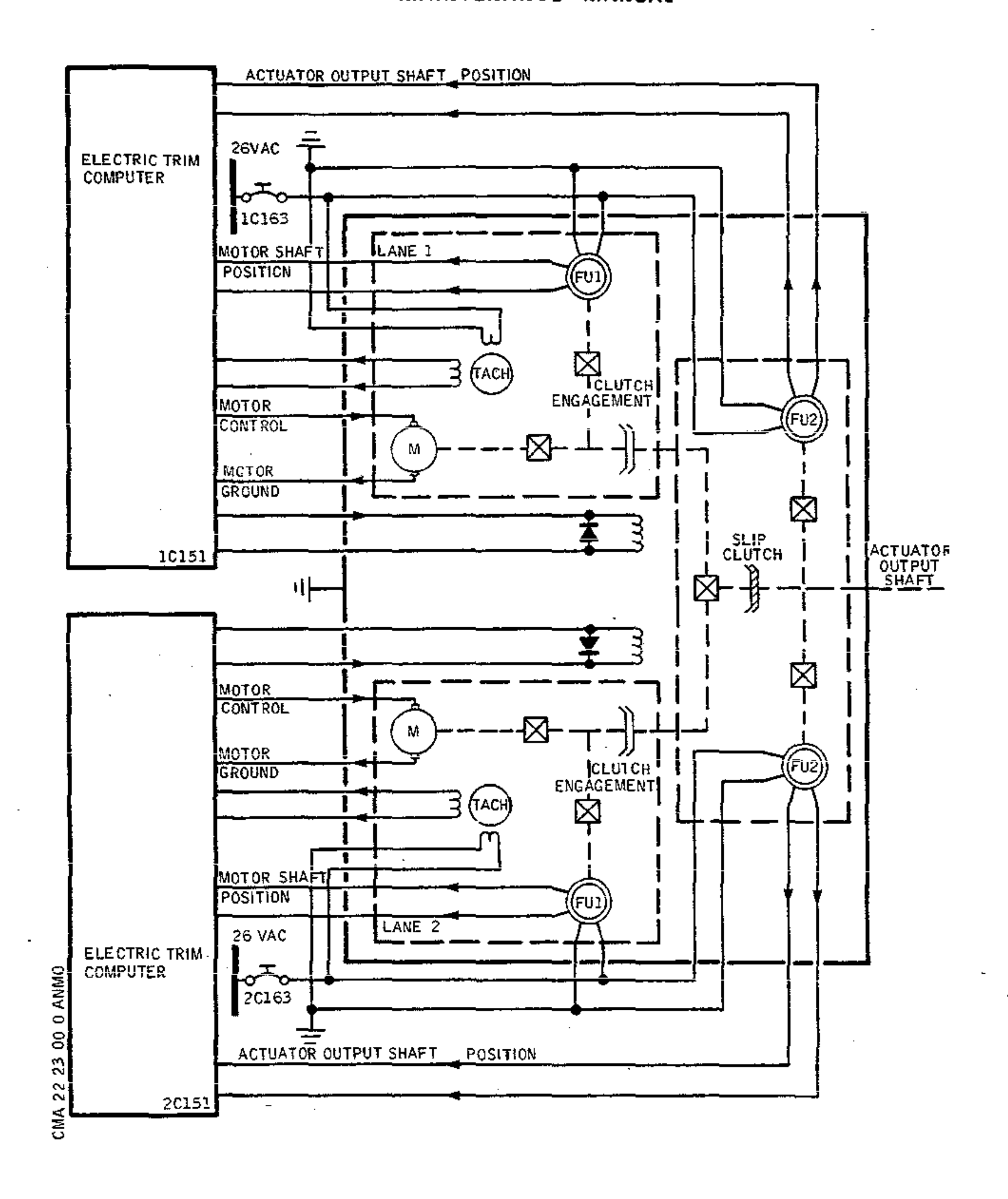
- one electric motor supplied with Direct Current (Maximum value ± 22 VDC).
- one tachometer generator supplied with 26 V - 400 Hz.
- one electro-magnetic clutch with a winding protected by diodes.
- two synchro transmitters (FU1 and FU2) supplied with 26 V - 400 Hz.

The electro-magentic clutches associated with the two systems control a unique shaft via a coupling stage (torque limiting slip clutch). The slip clutch calibration permits continuous adjustment between 0.4 and 1 m.daN (35.358 and 88.47 lbf. in.).

B. Operation

The system is servo-positioned. When an order is applied at the input of one lane, the shaft is driven by the motor related to the active lane as long as the associated clutch is energized. The FU 1 synchro-transmitter provides the position return of the motor shaft, the FU2 synchro-transmitter provides the position return of the trim actuator output shaft. The tachometer generator is used to stabilize the motor by feedback.

In order to ensure system safety, a slip clutch is fitted on the output shaft, enabling the trim actuator to be overriden by the mechanical trim control wheel in case of malfunction. In addition, a mechanical fuse and a slip clutch at FU2 level override blocking at FU2 level.

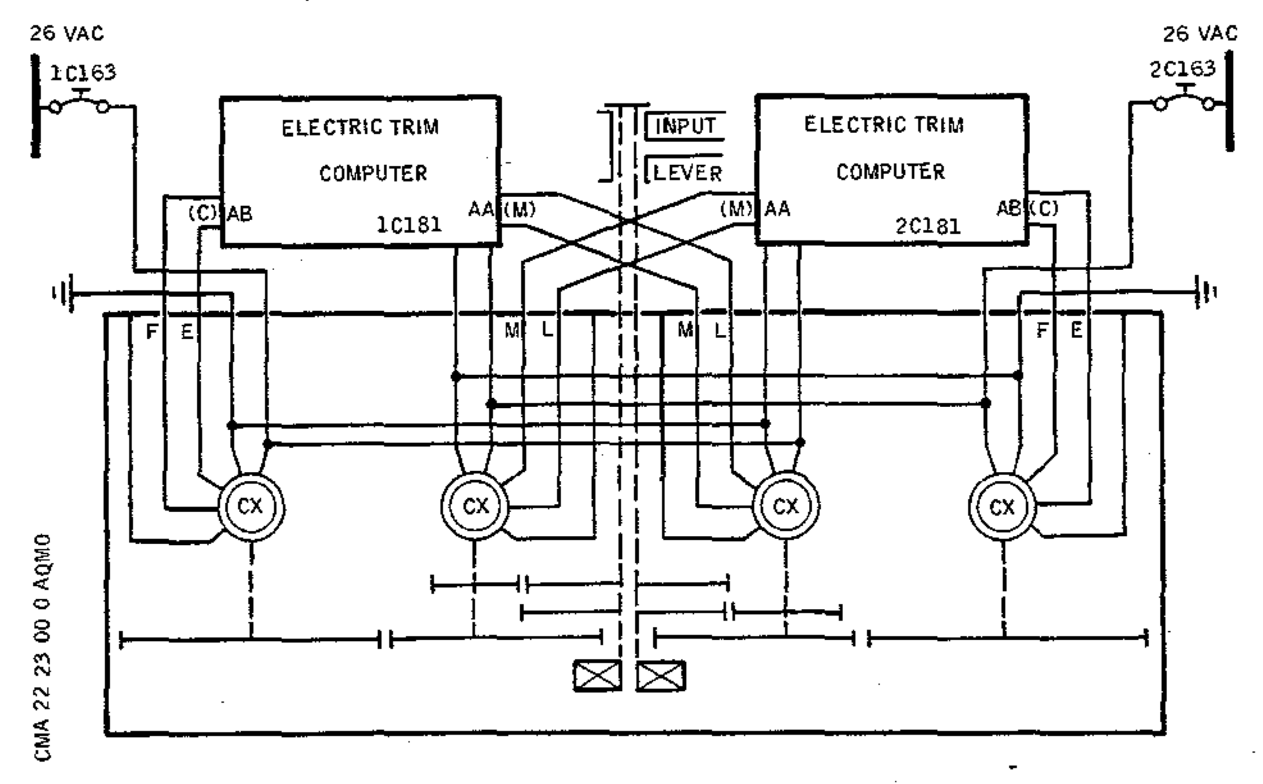


Trim Actuator - Schematic Diagram
Figure 008

R

5. Sensor - Pitch Feel
(Ref. Fig. 009)

A. Description



R Pitch Feel Sensor - Operation Principle
Figure 009

The pitch feel sensor is fitted on the artificial feel chassis. Two external electric sockets are provided, PA
R for lane 1, PB for lane 2, for electric connections. Arti-
R tificial feel lever displacement is transferred through a mechanical rod to the sensor input lever. This lever is doubled and of the fail-safe type in order to avoid any unit drive loss.

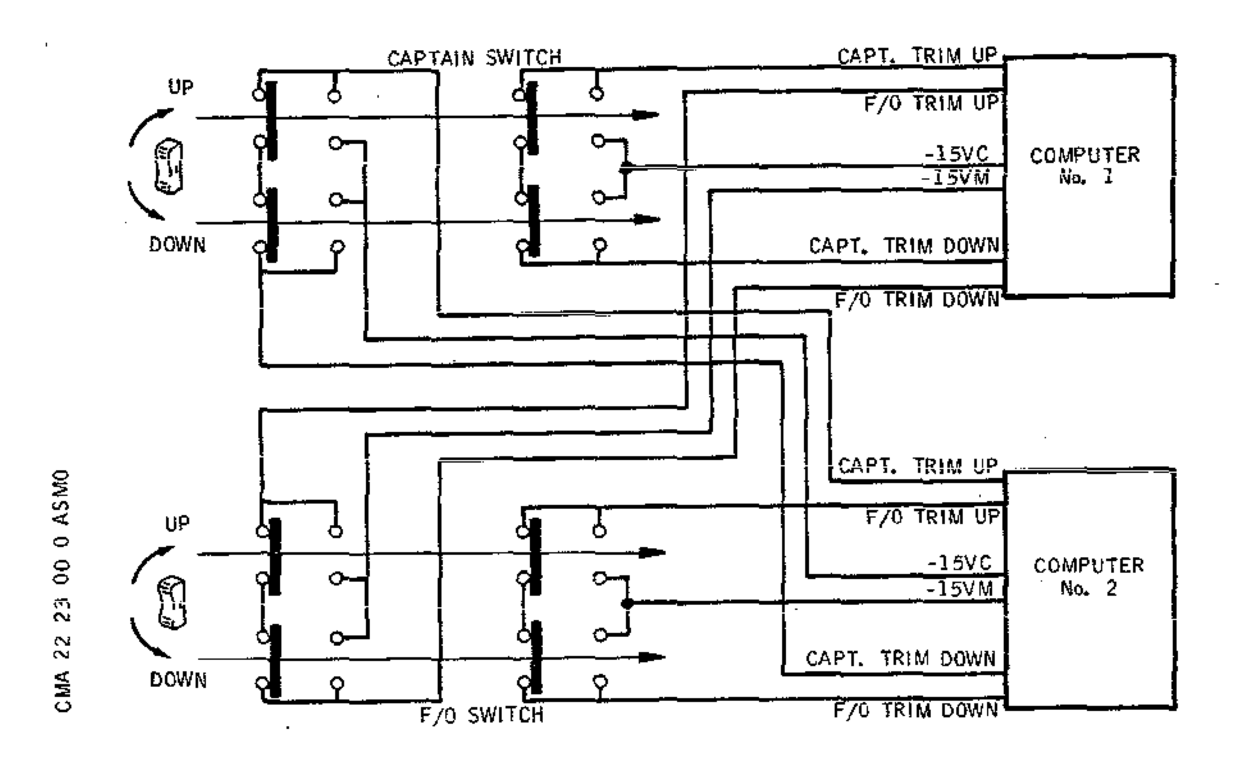
The pitch feel sensor comprises four synchro-transmitters linked in pairs and actuated by the input lever. To prevent the input lever from being blocked, causing blocking of
R artificial feel, the gears are provided with a mechanical fuse (pin). The input shaft is doubled and ball bearings
R supporting this shaft can rotate in their housing even if they are jammed.

B. Operation

R The artificial feel lever displacement causes rotation of
R the synchro-transmitters via the input lever, generating
R a voltage proportional to the "out-of-trim" deflection dif-
R ference of the pitch control. Sensitivity is approximately
R 800 mV per degree of elevon deflection. A 1° input lever
R displacement represents a synchro rotation of 3°. A synchro
rotation of 5° represents a displacement of 1° in the arti-
ficial feel bellcrank. The pitch feel sensor output signal
from Electric Trim computers is limited by a threshold.

The synchro transmitters are fed with 26 VDC - 400 Hz sup-
R ply which is routed in the housing before reaching the trim
computers. The 26VDC - 400 Hz routing is designed in such
a manner that housing plug disconnection is detected by
R the AC voltage monitoring in the computers.

6. Switches - PITCH TRIM
(Ref. Fig. 010)



Pitch Trim Switches - Schematic Diagram
Figure 010

A. Description

The pitch Trim switches allow manual control of Electric Trim ; they are located on the Captain's and the First Officer's control column handwheels. They each consist of four contacts, (two for nose-down, two for nose-up) controlled by a three-position switch (NEUTRAL - UP - DOWN).
R One contact locked in the active position does not prevent the others from operating and cancelling failure. Each computer supplies its associated pair of contacts via the stick force detectors (1C655), (2C655).

B. Operation

R Electric Trim operation following PITCH TRIM UP/DOWN switch operation results from two actions within the controlling trim computer.

- unlocking of digital integrator
- UP/DOWN order to the analog channel.

Both actions are necessary to cause trim operation.

If the two switches are operated simultaneously in opposite directions the electric trim system will disengage (monitoring of operation with respect to order from switches).

In order to provide protection against any unwanted voltage or short circuit which may initiate a trim rotation, the rest contacts (UP - DOWN) of the switches are connected to each other when PITCH TRIM switches are not operated.
The output signal from the Electric Trim computers is limited by a threshold.

7. Operation
(Ref. Fig. 011, 012 and 013)
(Ref. Fig. 014)

Each computer receives control voltages depending on the operation mode (synchronization, pilot trim and autotrim)and generates electric motor control signals (1 per lane). The motor drives the mechanical trim via an electro-magnetic clutch, a reduction gear set and finally a torque limiting slip clutch.

In addition, the stabilization functions apply the appropriate force to the control column taking into account the aircraft flight performance.

A. Synchronization

(1) Neither lane is engaged, the trim system is energized. The PITCH TRIM switches are ineffective.

Both systems are synchronized on the output shaft position, i.e. mechanical trim control wheel position. The FU2 (follow-up) position synchro-transmitters repeat the output shaft position (one FU2 per lane).

A given difference between the mechanically trimmed position (FU2) and the electric motor position (FU1) (one FU1 per lane) i.e. FU2 - FU 1 is integrated and results in an order to the motor which cancels this difference. Furthermore, the stabilization function signals are applied but are absorbed by the synchronization.

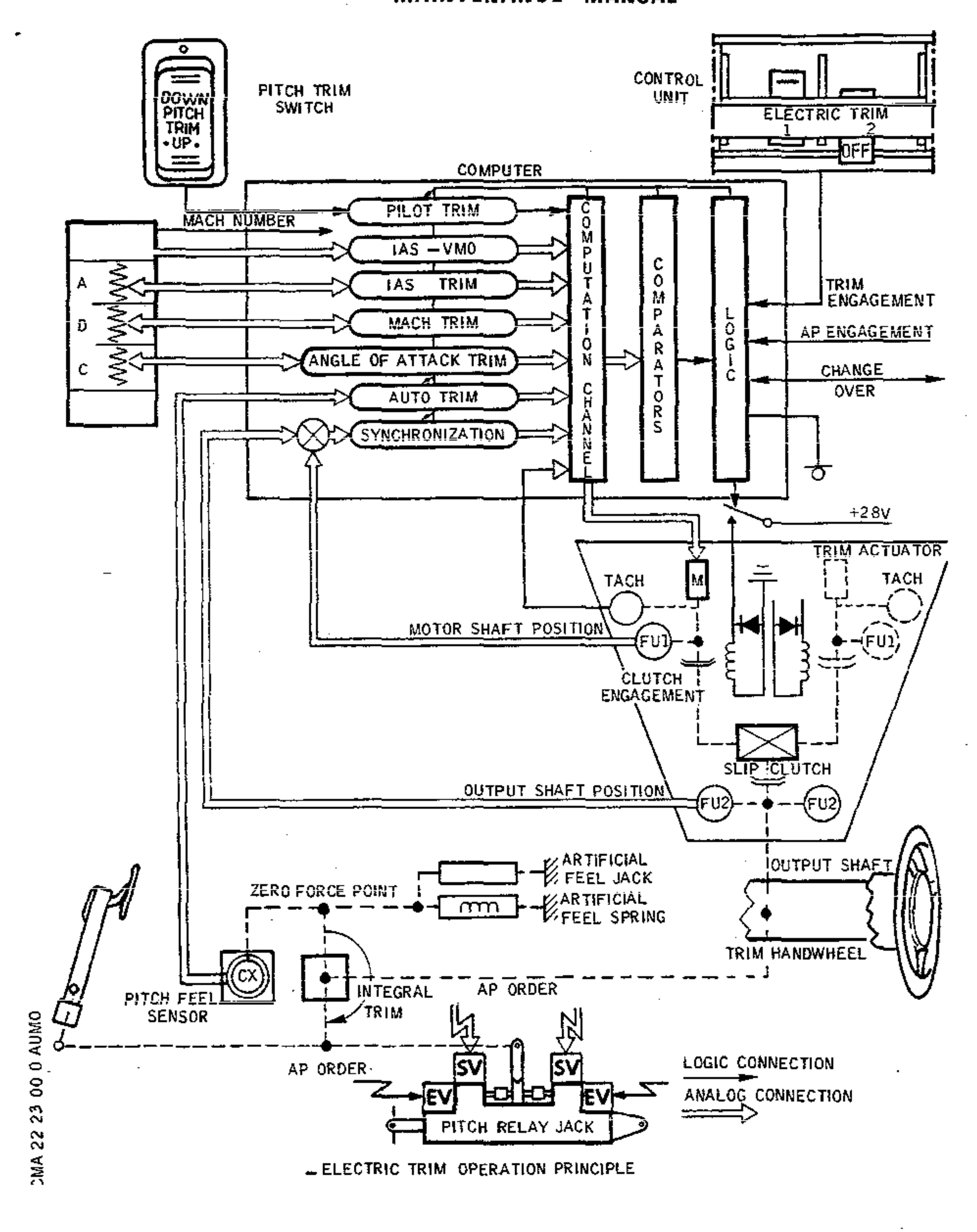
(2) With both lanes engaged lane 2 is synchronized with output shaft position, in other words, with lane 1 which is clutched and driving.

The high synchronization speed enables lane 2 not to disengage in case of overrun in lane 1.

B. Pilot Trim

R PITCH TRIM switch operation sends a signal to the input of a digital integrator which generates an output slope propor-
R tional to the duration of action on the switches.
The integrator output voltage remains at the level reached
R at the end of switch action. The servo-loop repeats the final slope obtained. Furthermore, logic data locks the digital integrator when no order is transmitted.

The stabilization functions directly control the servo-loop. A slope limiter or full time command modifier (FTCM) limits



Electric Trim Schematic
Figure 011

their action to the maximum useful value.

R As the pilot trim speed is higher than the stabilization
R trim speed it is possible for the pilot to override the stabilization functions in all cases.

A force of 26 daN (58.50 lbf.) approximately applied on the control column results in an effort from the artificial feel system and the spring rod.

R This effort, in opposite direction to trim rotation, causes the trim actuator slip clutch to slip.
Depending on the motor speed and on slip force, this effort is detected by FU1 and FU2 synchro transmitters after a delay of 3.5 s. in pilot trim operation, and after a delay of 5.5 s. in stabilization function operation ; lane 1 disconnects while lane 2 becomes active. The same delay is required to disconnect trim lane 2. If the effort is applied in the same direction as trim operation, an effort of 50 daN (112.50 lbf.) approximately is required to obtain slipping of actuator slip clutch. The disconnection delay remains unchanged.

C. Auto Trim

In this mode of operation, the autopilot must be engaged. It constantly cancels the artificial feel force, prohibiting any possible dangerous manoeuvre when disengaging the autopilot, such disengagement causing the control column to return to the neutral position (zero force).

In autotrim, the pilot trim function is inhibited, while the stabilization functions remain connected. However, their actions are inhibited by the autotrim system.

When the angle-of-attack of the aircraft is greater than 15°, Safety Flight Controls 1 and 2 inhibit autotrim displacement, except during GLIDE SLOPE and LOC TRACK modes.

The purpose of this function is to obtain (in case of excep-
R tional manoeuvres involving high angles-of-attack) an out-
R of-trim deflection causing a nose-down manoeuvre (decreasing
R the angle-of-attack) after automatic AP disconnection when the angle-of-attack is 18° or when the pitch attitude is 20°.

Loss of both SFC's does not involve loss of the electric trim system but causes loss of the autotrim inhibiting function when the angle-of-attack is equal to or greater than 15°.

D. Mechanical Trim

It is possible to override the electric trim rotation or manually trim the aircraft by means of the trim control wheel located on LH side of the centre console.

When the electric trim is overridden, both lanes are disengaged. The electric trim can be overridden by applying a force of approximately 7 daN (15.75 lbf.) to the trim control wheel.

E. Stabilization Functions

(1) Mach trim

At transonic speed (Mach 0.69 through 1.34), control surface deflection, as a function of mach, is inverted causing a natural static instability of the aircraft.

A mach trim function provides a normal sense of variation on the pitch control (nose up control : decrease of Mach ; nose down control : increase of Mach). By doing so, a correct static stability of the aircraft with a free control column is restored.

Mach	0.69	0.92	0.94	0.98	1.12	1.34
R Trim Deflection (Degrees)	0	- 1	-1.3	- 4	- 4	- 7

The mach trim function is provided by means of two functional potentiometers, No.3 (control) and No.4 (monitoring), in the Air Data Computer, provided with 8.2 V - 400 Hz power.

(2) Incidence trim

The purpose of this function is to establish a correct force on the control column when the angle-of-attack is higher than 11°.

R This function is provided by two ADC potentiometers, No.3 (control) and No.4 (monitoring), and a nose down order is issued when the angle-of-attack signal increases.

Angle of attack (Degrees)	11	12	13	18	20
Trim deflection (Degrees)	0	+0.2	+0.45	+3	+6.5

(3) "Speed" trim or IAS trim

The purpose of this function is to increase the aircraft static stability and to regulate the longitudinal stability according to the aircraft speed.

The purpose and force variation of this function and identical to those of the mach trim function.

This function is provided by two functional ADC potentiometers, No.18 (control) and No.19 (monitoring) provided with 8.2 V - 400 Hz power.

Speed (Knots)	200 or less	600 or more
Trim deflection (Degrees)	0	- 8

(4) IAS - VMO trim function

In order to ensure protection against overspeed within the aircraft flight peripheral envelope, a term proportional to the difference between the indicated airspeed
R (IAS) and the maximum operating speed provides a balanced operation of the trim in nose up direction.

This term is proportional to the Mach number ; it is active in the supersonic range only when the mach is greater than 1.15 and the (IAS - VMO) difference is greater than 5 knots.

Mach	1.15	2
K VMO (gain)	0	- 0.03

F. Warnings and Indicating

The positions of ELECTRIC TRIM 1 and 2 engage switches indicate the condition of the system.

The loss of one trim is indicated by :

- the return of the associated engage switch to the OFF position.

The loss of both trims is indicated by :

- the return of both engage switches to the OFF position.
- illumination of red TRIM warning light on the master warning panel, which is located on the ceiling panel.
- the activation of the single stroke gong aural warning.

The trim rotation is indicated by mechanical trim control wheel rotation and by the rattle aural warning.
In addition, the elevon trimmed deflection value is read on the graduated drum located by the trim control wheel.
The rattle aural warning level is reduced during average turbulences with the AP engaged. The aural warning sounds only when approximately 2° control surface deflection is reached.

G. Safeties

At any time the pilot can override the electric trim by operating the manual trim (slip clutch on the trim actuator output shaft). In case of override, the trim electric system is disconnected.

Simultaneous depression, in opposite directions, of the PITCH TRIM switches by the Captain and First Officer causes disconnection of the system.

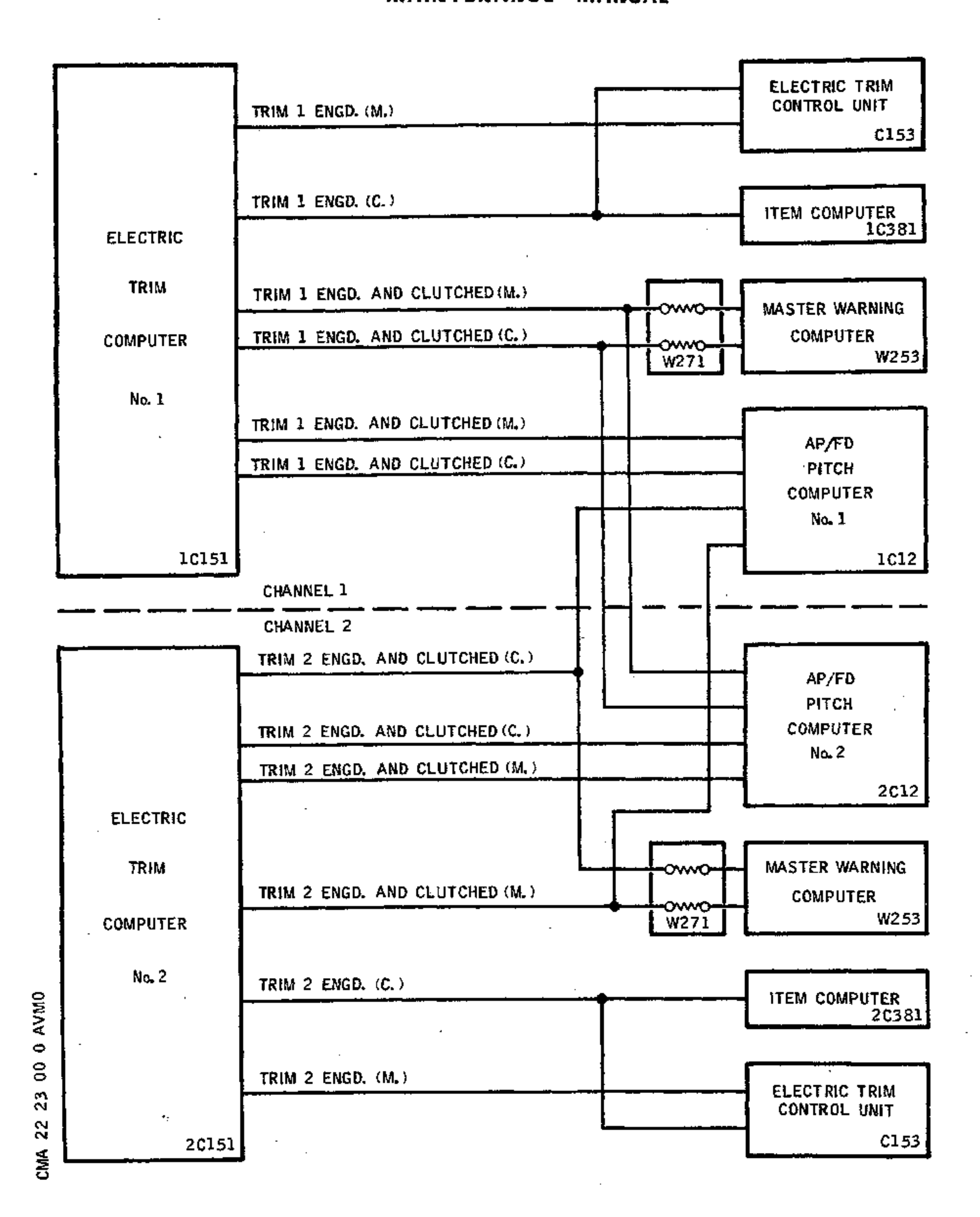
R A green scale ranging from - 1° through + 3.5° is found on
R the pitch trim graduated drum ; the trim must be within this range during take-off.

H. Monitoring

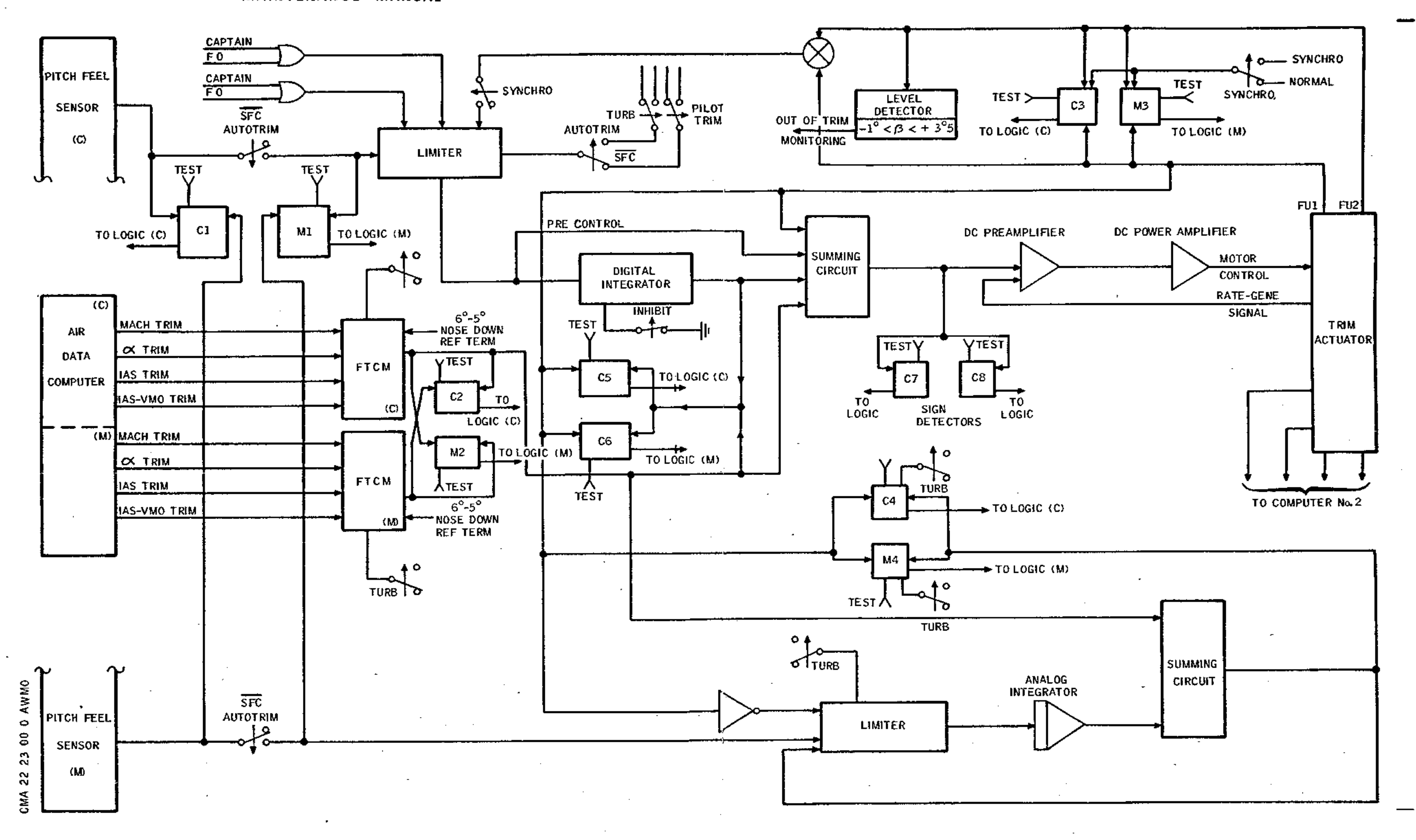
Monitoring is performed for the various functions ensured by the trim through comparators (control and monitoring) and voltage level detectors.

(1) Pilot Trim

The servo-loop is monitored by the return comparators (FU1, C5 and C6). This trim actuator output shaft



Electric Trim System Warnings
Figure 012



R

Trim Monitoring
Figure 013

FU1 position follow-up is compared to that related to FU2 by means of comparators C3 and N3. These comparators (C5, C6, C3, M3) disconnect the engaged channel in case of defective operation.

The control loop (PITCH TRIM switches, limiter, digital integrator) is monitored by a dual sense detector (C7 and C8). This dual detector causes the disconnection of the engaged channel in case of discrepancy between the signal issued by the switches and the displacement direction provided by the digital integrator except in "synchronization" and "autotrim" functions because, in this case, the switches are ineffective.

(2) Stabilization functions

These functions, generated by the ADC, are duplicated and monitored by comparators C2 and M2. The latter disconnect the engaged channel if the difference between the control and monitoring channels is too high.

(3) Autotrim

The position synchro detectors which are intended to provide data proportional to a load, are doubled and monitored by comparators C1 and M1. If the difference between the control and monitoring channels is higher than the comparators' threshold, the engaged channel is disconnected.

The threshold of comparators C4 and M4, which monitor the autotrim loop, is increased in "Turbulence" mode.

(4) Synchronization

The servo loop and the digital integrator are monitored by comparators C3, M3 and C5, C6.

Stabilization functions are constantly monitored by C2 and M2.

With the trim engaged, comparator activation makes the engage switch of the synchronized lane fall.

In autotrim synchronization, the position synchro-detectors are monitored by C1 and M1, the autotrim loop is monitored by comparators C4 and M4.

The comparator threshold and delay values are given below :

DESCRIPTION	THRESHOLD	DELAY
PITCH FEEL SENSOR COMPARATORS C1-M1	510 mV	200 ms
FTCM COMPARATORS C2-M2	475 mV	60 ms
FU SYNCHRO COMPARATORS C3-M3	415 mV	60 ms
FU COMPARATORS C3-M3	765 mV	60 ms
AUTOTRIM COMPARATORS C4-M4	360 mV	60 ms
TURBULENCE AUTOTRIM COMPARATORS C4-M4	600 mV	60 ms
POSITION RETURN COMPARATORS C5-C6	340 mV	120 ms

(5) Air data computer (ADC) failure

On detection of failure (28 VDC power supply cut-out) in the air data computer, the associated trim channel disengages (General Warning).

In GLIDE capture and LOC TRACK phases, the autopilot being engaged, this disengagement is inhibited.

On warning caused by angle of attack comparison, both lanes of the system disengage. This disengagement occurs only when the comparison shows a difference which reaches or exceeds 3 degrees during more than 1.6 seconds. This warning is inhibited as soon as an AP is engaged.

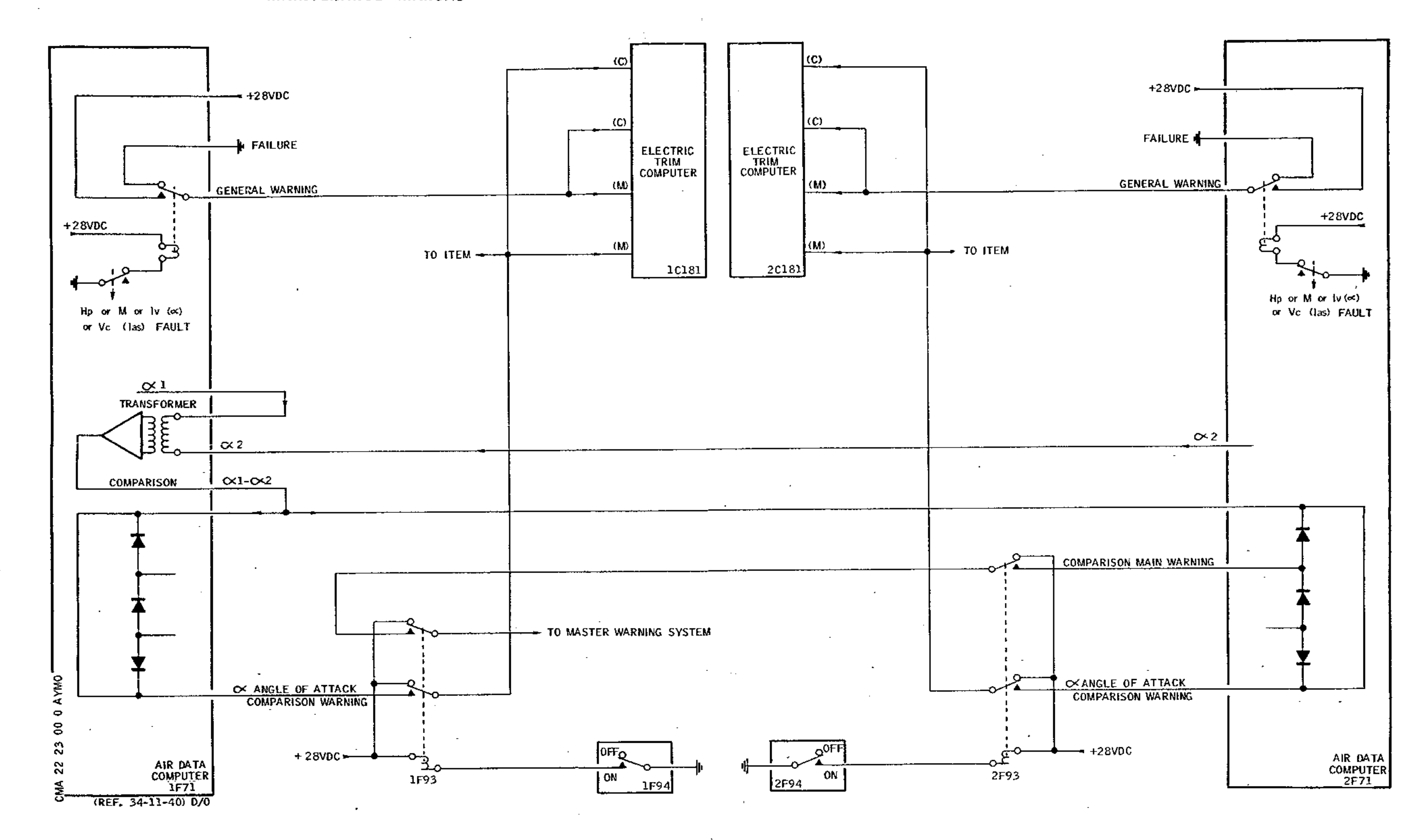
(6) Power supplies

The computer internal power supplies (+ 15 VDC and - 15 VDC) are monitored, this monitoring switches off the - 15 VDC signal issued to the computation circuits and engage switch if the voltage drops under a given value.
On + or - 15 VDC supply cut-out, the engage switch falls and the + 7 V (logic) supply is cut-out.

(7) "Out-of-trim" at take-off

Monitoring of "out-of-trim" at take-off is intended to provide protection against trim out of tolerance operation of the trim system or the ADC system (angle-of-attack sensors) or a defective trim adjustment at take-off.

Disconnection of both trims is achieved if the three following conditions are fulfilled :



Electric Trim System - ADS Warnings
Interconnection
Figure 014

R

EFFECTIVITY: ALL

BA

(a) At least one of the four throttle control levers against the high stop (maximum thrust).

(b) Elevon trimmed deflection is outside − 1° + 3.5° elevon deflection range.

(c) The aircraft being on the ground with shock-absorbers compressed ; monitoring remains active for 10 seconds after landing gear lift-off.

NOTE : In order to avoid an unwanted disconnection, during a touch-and-go landing, out-of-trim monitoring remains ineffective for 30 seconds after landing gear shock absorber compression.

(8) Tests

The ground test of monitoring and analog computation circuits of the trim system is carried out by the ITEM system.

The test sequence consists in applying stimuli with input and output addressing signals. Response signals during the various test phases, indicate the condition of internal components tested.

After simulation of trim engagement tested by the ITEM, the latter carries out the various test steps automatically.

(a) Comparator condition (no stimuli applied)

(b) Clutch circuit (stimuli are applied on one side of the comparators)

(c) Measurement of comparator activation time (stimuli are applied on both sides of comparators according to a step-by-step procedure).

(d) Equal gain between control and monitoring channels (stimuli are applied to the FTCM's and to the pitch feel sensor demodulators).

(e) Check of the monitoring autotrim loop.

(f) Check of the ± 15 V level detector.

(g) Check of the activation or non-activation of the input and output addressing.

Only the trim rotation sense detectors (C7 and C8) and a part of the logic are not tested.

Analog parts which are not tested during self-test are monitored (through trim system safety devices). Ground personnel may use the ITEM equipment to confirm a failure occured in flight, find its possible cause and eliminate detection when trouble-shooting has been achieved and, finally, check the new component installed.

8. Power Supply

The trim computers are supplied directly from 115 VAC avionics busbars and 28 VDC essential busbars. The 26 VAC main busbars supply the synchro rotors of the pitch feel sensors before supplying the computers.

SERVICE	BUSBAR	C/B PANEL	
TRIM 1 CONT	"A" ESSENTIAL	3P	1-213
TRIM COMP 1 SUP	"A" AVIONICS SHEDDABLE	10X	13-215
TRIM SYNCHRO SYS 1 SUP	"A" MAIN	12X	13-215
TRIM 2 CONT	"B" ESSENTIAL	4P	5-213
TRIM COMP 2 SUP	"B" AVIONICS SHEDDABLE	11X	13-216
TRIM SYNCHRO SYS 2 SUP	"B" MAIN	13X	13-216

ELECTRIC TRIM - TROUBLE SHOOTING

WARNING : OBSERVE THE ELECTRICAL SAFETY PRECAUTIONS DESCRIBED IN 24-00-00, SERVICING.
OBSERVE THE HYDRAULIC SAFETY PRECAUTIONS IN 22-23-00, ADJUSTMENT/TEST.

1. General

The following information is intended to enable faults found in flight or on the ground to be quickly rectified.

The system consists of two channels. Trouble shooting procedure described is for channel 1, trouble shooting procedure for channel 2 is indicated in parentheses.

A fault can be isolated with the aid of trouble shooting procedures (Refer to paragraph 3) by means of the ITEM system (Ref. 22-23-00, Adjustment/Test, Operational Test, paragraph 2C) then traced through OK and NOT OK paths. If a defect occurs perform the appropriate corrective action or refer to the chart indicated ; then, repeat the operation at which the defect was encountered to ensure that the operation is OK.

Bracketed numbers in the preparation procedure and charts indicate items on the component identification table (Ref. Table 101). Component location is also indicated in this table.

All procedures dealing with trouble shooting are based on the assumption that electrical wiring is serviceable and electrical power available.

If the fault is not rectified after the corrective action, check wiring in accordance with the Wiring Diagram Manual (Refer to Table 101).

2. Prepare

NOTE : Trouble shooting shall be carried out with aircraft on the ground, shock absorbers compressed.

A. Make certain that the travel ranges of the control surfaces are clear.

B. Make certain that the circuit breakers associated with the Electric Trim system (Ref. Table 101, items 3, 4, 20, 21, 24, 25) are set.

C. Connect electrical ground power unit and energize the

R aircraft electrical network (Ref. 24-41-00, Servicing).

R D. Check that electronics rack ventilation operates.
R (Ref. 21-21-00).

R E. Check that AP (1 or 2) may be engaged correctly
R (Ref. 22-10-00, Servicing).

R F. Check that the autothrottle may be engaged correctly
R (Ref. 22-31-00, Adjustment/Test, Operational Test).

R G. Check that it is possible to engage ADC1 and ADC2
R (Ref. 34-11-00, Adjustment/Test, Operational Test).

R NOTE : In order to avoid Electric Trim disengagement during
R procedure with ADC1 for checking of Electric Trim 1
R (ADC2 for checking of Electric Trim 2) it is recom-
R mended to hold ADC1 (ADC2) amber caption light pres-
R sed when TEST selector switch is placed from NORM
R position to position 1 then position 2 and vice
R versa.

R H. Make certain that the flight controls can be actuated in
R the blue electric mode (Ref. 27-00-00, Servicing).

R I. Pressurize Blue hydraulic system (Ref. 29-12-00, Servicing),
R and Green hydraulic system (Ref. 29-11-00, Servicing).

R J. Place the pitch trim control handwheel in 0° position.

R K. Place the four throttle control levers in idle position.

R 3. Trouble Shooting

```
R   ****************************************************
R   * Prepare system for trouble shooting as described  *
R   * in paragraph 2.                                   *
R   * Check on elapsed time indicator of Electric Trim  *
R   * computer No 1 [1] (No 2 [2] that 115 VAC supply   *
R   * is provided (pointer pulsating). IF              *
R   ****************************************************
R       ||   |         ------------------------------------------------
R       ||   |        | Remove Electric Trim computer No 1 [1]         |
R       ||   |        | (No 2 [2]). On connector 1C151AB (2C 151 AB)   |
R       OK   NOT OK----| check between terminals 29 and 16 (neutral)    |
R       ||            | that 115 VAC supply from circuit breaker       |
R       ||            | [3] ([4]) is provided as per wiring Diagram    |
R       ||            | Manual.                                        |
R       ||             ------------------------------------------------
R   ****************************************************
R   * By means of ITEM system on TEST UNIT, check       *
R   * Electric trim computer No 1 (No 2). Display data. *
R   * IF                                                *
R   ****************************************************
R       ||   |
R       ET   ET
R     PASS COMP
R       ||   |         ------------------------------------------------
R       OK   NOT OK----| Replace Electric Trim computer No 1 [1] (No 2  |
R       ||            | [2]).                                          |
R       ||             ------------------------------------------------
R   ****************************************************
R   * On ADC control panel, place ADC1 (ADC2) switch in *
R   * ON position. Press ADC1 (ADC2) amber caption light*
R   * to reset. On ceiling panel, place ELECTRIC TRIM 1 *
R   * (2) switch in ON position.                        *
R   * Check that Electric Trim 1 (2) remains engaged. IF*
R   ****************************************************
R       ||   |         ------------------------------------------------
R       ||   |        | Not possible to engage Electric Trim 1 (2).    |
R       OK   NOT OK----| Ref. Chart 101.                                |
R       ||             ================================================
R   ****************************************************
R   * Bring ELECTRIC TRIM 1 (2) back to OFF position.   *
R   * On master warning panel, check that TRIM red      *
R   * warning light illuminates. IF                     *
R   ****************************************************
R       ||   |         ------------------------------------------------
R       OK   NOT OK----| Refer to master warning system trouble shooting|
R       ||            | (35-15-00)                                     |
R       ||             ------------------------------------------------
R       ||
R       ||
```

```
R      ||
R   ***************************************************
R   * Re-engage ELECTRIC TRIM 1 (2) switch.Press Captain*
R   * PITCH TRIM switch [5] in UP direction.            *
R   * Check that switch 1 (2) remains engaged and that  *
R   * TRIM operates in up direction. IF                 *
R   ***************************************************
R      ||   |        ---------------------------------------------------
R      OK   NOT OK----| Disengagement of ELECTRIC TRIM 1 (2) switch  |
R      ||   |         | following Captain's PITCH TRIM switch        |
R      ||   |         | operation.                                   |
R      ||   |         | Ref Chart 102.                               |
R      ||   |        ---------------------------------------------------
R      ||   |        ---------------------------------------------------
R      ||   |         | No operation of Trim 1 (Trim 2) in UP direc- |
R      ||   NOT OK----| tion following Captain's PITCH TRIM switch   |
R      ||             | operation.                                   |
R      ||             | Ref. Chart 103.                              |
R      ||            ---------------------------------------------------
R   ***************************************************
R   * Press Captain's PITCH TRIM switch [5] in DOWN     *
R   * direction.                                        *
R   * Check that ELECTRIC TRIM 1 (2) switch remains     *
R   * engaged and that trim operates in down direction  *
R   * IF                                                *
R   ***************************************************
R      ||   |        ---------------------------------------------------
R      ||   |         | Disengagement of ELECTRIC TRIM 1(2) switch, or|
R      OK   NOT OK----| no operation of Trim 1 (2) in DOWN direction |
R      ||             | on operation of Captain's PITCH TRIM switch. |
R      ||             | Ref. Chart 104.                              |
R      ||            ---------------------------------------------------
R   ***************************************************
R   * Press First Officer's PITCH TRIM switch [6] in UP *
R   * then DOWN directions. Check that in each case     *
R   * ELECTRIC TRIM 1 (2) switch remains engaged and    *
R   * that trim operates in the selected direction. IF  *
R   ***************************************************
R      ||   |        ---------------------------------------------------
R      ||   |         | Disengagement of ELECTRIC TRIM 1 (2) switch or|
R      ||   |         | no operation of Trim 1 (2) in UP or DOWN     |
R      OK   NOT OK----| direction on operation of First Officer's    |
R      ||             | PITCH TRIM switch                            |
R      ||             | Ref. Chart 105                               |
R      ||            ---------------------------------------------------
R      ||
R      ||
R      ||
R      ||
R      ||
R      ||
R      ||
```

```
R        ||
R   ***************************************************
R   * On circuit-breaker panel 1-213, trip circuit      *
R   * breaker STICK SHAKER SUP W513, map ref. P 15      *
R   * Place pitch trim in 0 degree position.            *
R   * On ADC control panel, press then hold pressed     *
R   * ADC1 (ADC2) amber caption light, then place ADC1  *
R   * (ADC2) TEST selector switch in position 1         *
R   * Check that, while remaining engaged, Trim operates*
R   * to reach 3 degrees 30 minutes approximately in    *
R   * down direction.                                   *
R   * Then, place ADC1 (ADC2) TEST selector switch in   *
R   * position 2. Check that while remaining engaged    *
R   * trim operates in up direction to reach            *
R   * 11 degrees 30 minutes approximately. IF           *
R   ***************************************************
R        ||   |         ----------------------------------------------------
R        OK   NOT OK----| No operation of trim channel 1 (2) with          |
R        ||             | stabilization signals from air data computer     |
R        ||             | No 1 [7] (No 2 [8]).                              |
R        ||             | Ref. Chart 166.                                   |
R        ||             ----------------------------------------------------
R   ***************************************************
R   * On ADC control panel, place ADC1 (ADC2) TEST      *
R   * selector switch in NORM position. One minute later*
R   * approximately, release ADC1 (ADC2) amber caption  *
R   * light. On circuit breaker panel 1-213, set circuit*
R   * breaker STICK SHAKER SUP W513, map ref P 15.      *
R   * Place pitch trim in 0 degree position. On AFCS    *
R   * control unit, operate AP1 (AP2) switch. On centre *
R   * console, operate datum adjust unit AUTOPILOT      *
R   * switch in UP direction. Check that ELECTRIC TRIM 1*
R   * (2) switch remains engaged. IF                    *
R   ***************************************************
R        ||   |         ----------------------------------------------------
R        ||   |         | Disengagement of ELECTRIC TRIM 1 (2) switch in|
R        OK   NOT OK----| autotrim mode with AP1 (AP2) engaged.           |
R        ||             | Ref. Chart 107                                    |
R        ||             ----------------------------------------------------
R   ***************************************************
R   * Release AUTOPILOT taggle switch. Press Captain's  *
R   * PITCH TRIM switch [5] and First Officer's PITCH   *
R   * TRIM switch [6] alternately. Check that trim      *
R   * does not operate. If                              *
R   ***************************************************
R        ||   |         ----------------------------------------------------
R        OK   NOT OK----| No inhibition of pilot trim mode in autotrim    |
R        ||             | mode. Replace Electric Trim computer No 1 [1]   |
R        ||             | (No 2 [2]).                                       |
R        ||             ----------------------------------------------------
```

```
R       ||
R    ***************************************************
R    * On flight control panel, place the two ANTISTALL  *
R    * SYSTEM 1 and ANTISTALL SYSTEM 2 switches in ON    *
R    * position. On ADC control panel, place ADC2 (ADC1) *
R    * switch in ON position. Press ADC2 amber caption   *
R    * light, if illuminated, to reset.                  *
R    * On circuit breaker panels 1-213 and 3-213 respec- *
R    * tively trip LH UC WEIGHT SW A SYS SUP G 292       *
R    * map ref. M17 and RH UC WEIGHT SW A SYS SUP G 294  *
R    * map ref. B9 circuit breakers. Act on RH and LH    *
R    * angle of attack sensoms located respectively in   *
R    * zones 113 and 114 in order to read an angle of    *
R    * attack greater than or equal to 16 degrees on     *
R    * Captain's and First Officer angle of attach indi- *
R    * cators.                                           *
R    * On centre console, operate datun adjust unit      *
R    * AUTOPILOT toggle switch in DOWN direction.        *
R    * Check that trim does not operate. IF              *
R    ***************************************************
R       ||   |
R       ||   |    -------------------------------------------------
R       ||   |    | No inhibition of Trim 1 (2) operation in      |
R       OK  NOT OK----| autotrim mode with angle of attack greater |
R       ||        | than or equal to 16 degrees.                   |
R       ||        | Ref. Chart 108.                                |
R       ||        -------------------------------------------------
R       ||
R    ***************************************************
R    * Act on angle of attack sensors in order to read an*
R    * angle of angle of attack equal to 0 degrees on    *
R    * Captain's and First Officer's angle of attack in- *
R    * dications. On circuit breaker panels 1-213 and    *
R    * 3-213 respectively set circuit breakers LH UC     *
R    * WEIGHT SWA SYS SUP G292, map ref M17 and RH UC    *
R    * WEIGHT SW A SYS SUP G294, map ref B9. On centre   *
R    * console, operate datum adjust unit AUTOPILOT      *
R    * Toggle switch in UP direction, then select TURB   *
R    * mode on AFCS control unit. Check that ELECTRIC    *
R    * TRIM switch 1 (2) remains engaged. IF             *
R    ***************************************************
R       ||   |
R       ||   |    -------------------------------------------------
R       ||   |    | Disengagement of ELECTRIC TRIM 1 (2) switch   |
R       OK  NOT OK----| in autotrim mode on selection of TURB mode. |
R       ||        | Replace trim computer No 1 [1] (No 2 [2]).     |
R       ||        -------------------------------------------------
R       ||
R       ||
```

```
R   ***************************************************
R   * On AFCS control unit, select PITCH HOLD mode.   *
R   * On centre console, operate datum adjust unit    *
R   * AUTOPILOT toggle switch in NOSE DOWN direction  *
R   * while disengaging AP1 (AP2) switch on AFCS control*
R   * unit.                                           *
R   * Release AUTOPILOT toggle switch.                *
R   * Check that control column remains in the position *
R   * taken on disengagement without any jerk. IF     *
R   ***************************************************
R       ||  |        --------------------------------------------------
R       ||  |        | In auto trim mode, failure of trim operation  |
R       OK  NOT OK----| order follow-up function.                    |
R       ||           | Ref. Chart 109.                               |
R       ||           --------------------------------------------------
R   ***************************************************
R   * On AFCS control unit, place AP2 (AP1) switch in ON*
R   * position. On the centre console, operate datum  *
R   * adjust AUTOPILOT toggle switch in NOSE UP       *
R   * direction.                                      *
R   * Check that ELECTRIC TRIM 1 (2) switch remains   *
R   * engaged. IF                                     *
R   ***************************************************
R       ||  |        --------------------------------------------------
R       ||  |        | In autotrim mode, with AP2 (AP1) switch enga- |
R       OK  NOT OK----| ged ELECTRIC TRIM 1 (2) switch disengages.   |
R       ||           | Ref. Chart 110.                               |
R       ||           --------------------------------------------------
R   ***************************************************
R   * On ADC control panel, place ADC1 (ADC2) TEST    *
R   * selector switch in COMP position.               *
R   * Check that ELECTRIC TRIM 1 (2) switch remains   *
R   * engaged. IF                                     *
R   ***************************************************
R       ||  |        --------------------------------------------------
R       ||  |        | Disengagement of ELECTRIC TRIM 1 (2) switch   |
R       OK  NOT OK----| on failure of angle of attack comparison with |
R       ||           | one AP engaged.                               |
R       ||           | Replace Electric Trim computer No 1 [1]       |
R       ||           | (No 2 [2]).                                   |
R       ||           --------------------------------------------------
R       ||
R       ||
R       ||
R       ||
R       ||
R       ||
R       ||
```

```
R   ****************************************************
R   * On AFCS control unit, disengage AP2 (AP1) switch. *
R   * Check that ELECTRIC TRIM 1 (2) switch returns to  *
R   * OFF. IF                                           *
R   ****************************************************
R        ||   |          ----------------------------------------------------
R        ||   |         | ELECTRIC TRIM 1 (2) switch remains in ON           |
R        ||   |         | position on failure of angle of attack             |
R        OK   NOT OK----| comparison function, with no AP engaged.           |
R        ||             | Ref. Chart 111.                                    |
R        ||              ----------------------------------------------------
R   ****************************************************
R   * On ADC control panel, place ADC1 (ADC2) TEST      *
R   * selector switch in NORM position, then place ADC2 *
R   * (ADC1) switch in OFF position. Set pitch trim to  *
R   * 0 degrees. Engage ELECTRIC TRIM 2 (2) switch.     *
R   * Operate trim to read an 8 degree up deflection:   *
R   * Place throttle control levers No 1 and No 3 in    *
R   * maximum thrust position 30 minutes later approxi- *
R   * mately, check that ELECTRIC TRIM 1 (2) switch     *
R   * returns to OFF. IF                                *
R   ****************************************************
R        ||   |          ----------------------------------------------------
R        ||   |         | Safety feature at take off ineffective with        |
R        ||   |         | throttle control levers No1 and No3 in maximum     |
R        OK   NOT OK----| thrust position.                                   |
R        ||             | Ref. Chart 112.                                    |
R        ||              ----------------------------------------------------
R   ****************************************************
R   * Bring pitch trimback to 0 degrees. Bring throttle *
R   * control levers No 1 and No 3 back to idle posi-   *
R   * tion. Place ELECTRIC TRIM 1 (2) switch in ON      *
R   * position. Operate trim to read an 8 degree up    *
R   *  deflection. Place throttle control levers No 2   *
R   * and No 4 in maximum thrust position. 30 seconds   *
R   * later approximately, check that ELECTRIC TRIM 1   *
R   * (2) switch returns to OFF. IF                     *
R   ****************************************************
R        ||   |          ----------------------------------------------------
R        ||   |         | Safety feature at take off ineffective with        |
R        ||   |         | throttle control levers No 2 and No 4 in           |
R        OK   NOT OK----| maximum thrust position.                           |
R        ||             | Ref. Chart 113.                                    |
R        ||              ----------------------------------------------------
R        ||
R        ||
R        ||
R        ||
```

```
R   *****************************************************
R   * Bring pitch trin back  to 0 degrees.              *
R   * Place ELECTRIC TRIM 1 (2) switch in ON position.  *
R   * Check that switch remains engaged. IF             *
R   *****************************************************
R       ||   |
R       ||   |         ------------------------------------------------
R       ||   |         | ELECTRIC TRIM 1 (2) switch does not remain in |
R       ||   |         | ON position with out-of-trim safety feature at|
R       OK   NOT OK----| take off overriden.                           |
R       ||             | Replace Electric Trim computer No 1 [1]       |
R       ||             | (No 2 [2])                                    |
R       ||             ------------------------------------------------
R   *****************************************************
R   * Electric Trim 1 (2) is operative. IF              *
R   *****************************************************
R       ||   |         ------------------------------------------------
R       ||   |         | Repeat trouble shooting procedure for Electric|
R       OK   NOT OK----| Trim 1, using information given in parentheses|
R       ||             ------------------------------------------------
R       ||
R   *****************************************************
R   * Place throttle control levers No 2 and No 4 in    *
R   * idle positions.                                   *
R   * Place ELECTRIC TRIM 2 in ON position.             *
R   * Press Captain's PITCH TRIM switch [5] in UP       *
R   * direction.                                        *
R   * Check that trim operates in selected direction.   *
R   * While trim is operating, bring ELECTRIC TRIM 1    *
R   * switch back to OFF.                               *
R   * Check that trim is still operating with trim 2    *
R   * engaged. IF                                       *
R   *****************************************************
R       ||   |         ------------------------------------------------
R       ||   |         | No Trim 1 - Trim 2 change-over signal.        |
R       OK   NOT OK----| Ref. Chart 114.                               |
R       ||             ------------------------------------------------
R       ||
R   *****************************************************
R   * Bring ELECTRIC TRIM 2 switch back to OFF.         *
R   * Bring various systems used for trouble shooting   *
R   * back to initial condition.                        *
R   * Electric trim system is operative.                *
R   *****************************************************
```

```
R  ***************************************----------------------------------
R  * NOT POSSIBLE TO ENGAGE ELECTRIC     *| GROUND EQUIPMENT REQUIRED       |
R  * TRIM 1 (2).                         *----------------------------------
R  ***************************************| DESCRIPTION         PART NO     |
R                                         ----------------------------------
R                                         | MULTIMETER                      |
R                                         ----------------------------------

R  ********************************************************
R  * For test purposes, replace Electric Trim computer *
R  * No 1 [1] (No 2 [2])                                *
R  * Place ELECTRIC TRIM 1 (2) switch in ON position.   *
R  * Check that switch remains engaged.                 *
R  ********************************************************
R      |    |       ---------------------------------------------------
R      NO   YES-------| Replace removed computer by the new one.       |
R      |            ---------------------------------------------------

R  ********************************************************
R  * On circuit breaker panel 1-213, trip circuit       *
R  * breakers STICK SHAKER SUP W513, map ref. P 15, and*
R  * LH UC WEIGHT SW A SYS SUP G292, map ref. M 17. On *
R  * circuit breaker panel 3-213, trip circuit breaker *
R  * G294, map ref B9. Check that circuit breakers used*
R  * in wobbler warning operational test (Ref.227-39-00*
R  * Adjustment/Test, paragraph 3) are set. On ADC      *
R  * control panel, place ADC1 (ADC2) TEST selector     *
R  * switch in position 1. 30 seconds later             *
R  * approximately, press ADC1 (ADC2) amber caption     *
R  * light to reset. On  ceiling panel, engage          *
R  * ARTIFICIAL FEEL No 1 (No 2) PITCH switch. On       *
R  * flight control unit C57, place ANTISTALL SYSTEM 1 *
R  * (2) PITCH lever in ON position. Slightly pull      *
R  * Captain's control colums. Check that a shaking     *
R  * is felt.                                           *
R  ********************************************************
R      |    |       ---------------------------------------------------
R      YES  NO--------| Replace ADC No1 (No2) control relay [9] ([10]) |
R      |            ---------------------------------------------------
R      |                        |                       |
R      |                        NO                      YES
R      |                        |                       |
R      |            ---------------------------------------------------
R      |            | Replace air data      || Replace removed relay |
R      |            | computer No 1 [7]     || by the new one        |
R      |            | (No 2 [8])            |-------------------------
R      |            -------------------------
```

Chart 101 (Sheet 1 of 3)

```
R  ***************************************************
R  * Bring ANTISTALL SYSTEM 1 (2) switch back to OFF   *
R  * position.                                         *
R  * Bring ARTIFICIAL FEEL No 1 (No 2) unit PITCH lever*
R  * back to OFF position.                             *
R  * On ADC control panel, place ADC1 (ADC2) TEST      *
R  * Selector switch in NORM position. 30 seconds later*
R  * approximately press ADC1 (ADC2) amber caption     *
R  * light to reset.                                   *
R  * On circuit breaker panels 1-213 and 3-213, reset  *
R  * circuit breakers previously tripped.              *
R  * On front face of electric trim computer No 1      *
R  * (No 2) measure direct voltage between pins 5 and  *
R  * 14 (ground). Voltage reading is :                 *
R  ***************************************************
R       |        |
R    +4.5V       |    ------------------------------------------------
R    ±1.5V      -10V±2V| Replace trim actuator [11].                    |
R       |             ------------------------------------------------
R  **************************************************
R  * On front face of Electric trim computer No 1     *
R  * (No 2) measure voltage on ZA test connector bet- *
R  * ween pins 3 and 14 (ground). Voltage reading is :*
R  **************************************************
R       |        |
R    +6.5V       |    ------------------------------------------------
R    ±1.5V       |    |                                                 |
R       |       -10V±2V| Replace air data computer No 1 [7] (No 2 [8])  |
R       |             ------------------------------------------------
R  **************************************************
R  * Remove Captain's handwheel hub cover.            *
R  * Disconnect connector 1C655A (1C655B).            *
R  * Place ELECTRIC TRIM 1 (2) switch in ON position. *
R  * Check that switch remains engaged.               *
R  **************************************************
R       |        |    ------------------------------------------------
R      NO       YES--| Replace Captain's PITCH TRIM 1 (2) UP [12]      |
R       |            | ([13]) Down [14] ([15]) switches then           |
R       |            | carry out test following connector              |
R       |            | disconnection. (Ref. 27-11-11 Adjustment/Test).|
R       |             ------------------------------------------------
```

R Chart 101 (Sheet 2 of 3)

```
R   ****************************************************
R   * Remove First Officer's handwheel hub cover.      *
R   * Disconnect plug 2C655A (2C655B).                 *
R   * Place ELECTRIC TRIM 1 (2) switch in ON position. *
R   * Check that switch remains engaged.               *
R   ****************************************************
R        |   |            ------------------------------------------------
R        |   |           | Replace First Officer's PITCH TRIM 1 (2)       |
R        NO  YES-------| UP [16] ([17]) DOWN [18] ([19]) switches,      |
R        |               | then carry out test following connector        |
R        |               | disconnection (Ref. 27-11-11 Adjustment/Test). |
R        |                ------------------------------------------------
R   ****************************************************
R   * At flight compartment, remove floor panel 211HF  *
R   * Disconnect connector C154A (C154B). Check that   *
R   * 26 VAC supply is provided between pins H and J   *
R   * (neutral).                                       *
R   ****************************************************
R        |   |            ------------------------------------------------
R        YES NO--------| Replace circuit breaker [20] ([21])            |
R        |                ------------------------------------------------
R   ****************************************************
R   * Remove Electric Trim computer No 1 [1] (No 2 [2]).*
R   * On shelf connector 1C 151 AB (2C 151 AB), check  *
R   * that 26 VAC supply is provided between pins 28   *
R   * and 15 (neutral).                                *
R   ****************************************************
R        |   |            ------------------------------------------------
R        NO  YES-------| Replace Electric Trim control unit [22].       |
R        |                ------------------------------------------------
R        |
R        |                ------------------------------------------------
R        --------------| Replace pitch feel sensor [23].                |
R                         ------------------------------------------------
```

Chart 101 (Sheet 3 of 3)

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```
R   ************************************
R   * DISENGAGEMENT OF ELECTRIC TRIM    *
R   * SWITCH 1 (2) FOLLOWING CAPTAIN's  *
R   * PITCH TRIM UP/DOWN SWITCH OPERATION*
R   ************************************

R   ****************************************************
R   * For test purposes, replace Electric Trim computer *
R   * No 1 [1] (No 2 [2]).                              *
R   * Place ELECTRIC TRIM 1 (2) switch in ON position.  *
R   * Operate Captain's PITCH TRIM UP/DOWN switches in  *
R   * UP direction                                      *
R   * Check that ELECTRIC TRIM 1 (2) switch remains     *
R   * engaged.                                          *
R   ****************************************************
R         |   |
R         |   |          ------------------------------------------------
R         NO  YES-------| Replace removed Electric Trim conputer by the |
R         |             | new one.                                      |
R         |              ------------------------------------------------
R   ****************************************************
R   * Remove Electric Trim No 1 [1] (No 2 [2]).         *
R   * On connector 1C 151 AB (2C 151 AB), check that    *
R   * 28 VDC supply from circuit breaker [24] ([25])    *
R   * is provided between pins 4 and 5 (ground).        *
R   ****************************************************
R         |   |
R         |   |          ------------------------------------------------
R         YES NO--------| Replace circuit breaker [24] ([25]).          |
R         |              ------------------------------------------------
R         |
R   ****************************************************
R   * NOTE : The following trouble shooting procedure  *
R   *        applies for Trim channel 2 only            *
R   *                                                   *
R   * Replace Electric Trim computer No 1 [1].          *
R   * Place ELECTRIC TRIM 2 switch in UP position       *
R   * Operate Captain's PITCH TRIM UP/DOWN switch in UP *
R   * direction.                                        *
R   * Check that ELECTRIC TRIM 2 switch remains engaged *
R   ****************************************************
R         |   |          ------------------------------------------------
R         YES YES-------| Replace removed computer by the new one.      |
R         |              ------------------------------------------------
```

Chart 102 (Sheet 1 of 2)

```
R       |
R   ***************************************************
R   * Reinstall Electric Trim computer No 1 [1] (No 2   *
R   * [2]). Place ELECTRIC TRIM switch 1 (2) in ON      *
R   * position. Press First officer's PITCH TRIM UP/DOWN*
R   * switch in UP direction                            *
R   * Check that ELECTRIC TRIM 1 (2) switch remains     *
R   * engaged.                                          *
R   ***************************************************
R       |   |
R       |   |         ------------------------------------------
R      YES NO--------| Replace trim actuator [11].             |
R       |             ------------------------------------------
R       |             ------------------------------------------
R       |            | Replace switch [12] ([13]) of Captain's |
R       -------------| PITCH TRIM UP/DOWN switch [5].          |
R                     ------------------------------------------
```

Chart 102 (Sheet 2 of 2)

```
R   ************************************
R   *NO OPERATION OF TRIM 1 (2) IN UP    *
R   * DIRECTION FOLLOWING CAPTAIN'S PITCH*
R   * TRIM UP/DOWN SWITCH OPERATION      *
R   ************************************


R   ****************************************************
R   * For test purposes, replace Electric trim computer *
R   * No 1 [1] (No 2 [2]).                              *
R   * Place ELECTRIC TRIM 1 (2) switch in ON position   *
R   * Operate Captain's PITCH TRIM UP/DOWN switch in    *
R   * UP direction                                      *
R   * Check trim operates in up direction.              *
R   ****************************************************
R        |   |
R        |   |         ---------------------------------------------------
R       NO  YES-------| Replace removed Electric Trim computer by the   |
R        |            | new one.                                        |
R                      ---------------------------------------------------
R        |
R   ****************************************************
R   * Press First Officer's PITCH TRIN UP/DOWN switch   *
R   * in UP direction                                   *
R   * Check that trim operates in selected direction.   *
R   ****************************************************
R        |   |
R        |   |         ---------------------------------------------------
R       NO  YES-------| Replace Captain's UP [12] ([13]) switch.        |
R        |             ---------------------------------------------------
R        |
R        |             ---------------------------------------------------
R        -------------| Replace trim actuator [11].                     |
R                      ---------------------------------------------------
```

Chart 103

```
R   ************************************
R   * DISENGAGEMENT OF ELECTRIC TRIM 1   *
R   * (2) SWITCH OR NO OPERATION OF      *
R   * TRIM 1 (2) IN DOWN DIRECTION       *
R   * FOLLOWING CAPTAIN'S PITCH TRIM     *
R   * UP/DOWN SWITCH OPERATION           *
R   ************************************

R   ***************************************************
R   * For test purposes, replace Electric Trim computer *
R   * No 1 [1] (No 2 [2]).                              *
R   * Engage ELECTRIC TRIM 1 (2) switch                 *
R   * Operate Captain's PITCH TRIM UP/DOWN switch in    *
R   * DOWN direction                                    *
R   * Check that ELECTRIC TRIM 1 (2) switch remains     *
R   * engaged and that trim operates in down direction. *
R   ***************************************************
R       |   |
R       |   |
R       |   |      -------------------------------------------------
R      NO  YES-------| Replace removed computer by the new one       |
R       |          -------------------------------------------------
R
R       |          -------------------------------------------------
R       -------------| Replace Captain's DOWN Switch [14] ([15]).    |
R                  -------------------------------------------------
```

Chart 104

```
R   ***************************************
R   * DISENGAGEMENT OF ELECTRIC TRIM 1    *
R   * (2) SWITCH OF NO OPERATION OF TRIM *
R   * 1 (2) IN UP OR DOWN DIRECTION       *
R   * FOLLOWING FIRST OFFICER'S PITCH     *
R   * TRIM SWITCH OPERATION               *
R   ***************************************
R
R   *****************************************************
R   * For test purposes, replace Electric Trim computer *
R   * No 1 [1] (No 2 [2]).                              *
R   * Engage ELECTRIC TRIM 1 (2) switch.                *
R   * Operate First Officer's PITCH TRIM UP/DOWN switch *
R   * [6] in UP or DOWN direction                       *
R   * Check that ELECTRIC TRIM 1 (2) switch remains     *
R   * engaged and that trim operates in the selected    *
R   * direction.                                        *
R   *****************************************************
R       |   |
R       |   |
R       |   |       ---------------------------------------------------
R       NO  YES-------| Replace removed computer by the new one        |
R       |             ---------------------------------------------------
R
R       |             ---------------------------------------------------
R       |             | Check condition of (UP or DOWN) switches       |
R       |-------------| and replace them as necessary                  |
R                     ---------------------------------------------------
```

Chart 105

```
R   ************************************
R   * NO OPERATION OF TRIM 1 (2) WITH    *
R   * STABILIZATION SIGNALS FRON AIR DATA*
R   * COMPUTER No 1 (No 2)               *
R   ************************************
R
R   ***************************************************
R   * For test purposes, replace Electric Trim computer *
R   * No 1 [1] (No 2 [2]).                             *
R   * Engage ELECTRIC TRIM 1(2) switch. On circuit     *
R   * breaker panel 1-213, trip circuit breaker W 513  *
R   * to avoid stick shaker operation.                 *
R   * With trim handwheel in 0 degree position, check  *
R   * that, when ADC control panel ADC1 (ADC2) TEST    *
R   * selector switch is successively placed in position*
R   * 1, then in position 2, trim remains engaged and  *
R   * ICOVOL indicator displays a 3 degree 30 minutes  *
R   * deflection in down direction, then, an 11 degree *
R   * 30 minutes deflection in up direction.           *
R   ***************************************************
R        |    |
R        |    |       -----------------------------------------------------
R       NO   YES-------| Replace removal computer by the new one.          |
R        |            -----------------------------------------------------
R        |            -----------------------------------------------------
R        --------------| Replace air data computer No 1 [7] (No 2 [8]).   |
R                     -----------------------------------------------------
```

Chart 106

```
R   ***************************************------------------------------
R   * DISENGAGEMENT OF ELECTRIC TRIM 1    *| GROUND EQUIPMENT REQUIRED  |
R   * (2) IN AUTOTRIM MODE WITH AP1 (AP2)*------------------------------
R   * ENGAGED                             *| DESCRIPTION       PART NO  |
R   ***************************************------------------------------
R                                          | MULTIMETER                 |
R                                          ------------------------------
R
R   *****************************************************
R   * For test purposes, replace Electric Trim computer *
R   * No 1 [1] (No 2 [2]).                              *
R   * Operate ELECTRIC TRIM 1 (2) switch.               *
R   * Operate AP1 switch.                               *
R   * Operate datum adjust unit AUTOPILOT toggle switch *
R   * in UP direction.                                  *
R   * Check that ELECTRIC TRIM 1 (2) switch remains     *
R   * engaged.                                          *
R   *****************************************************
R       |   |
R       |   |        ----------------------------------------------------
R       NO  YES------| Replace removed computer by the new one          |
R       |            ----------------------------------------------------
R   *****************************************************
R   * On front face of Electric Trim computer, check    *
R   * voltage on ZA test connectors between pins 1 and  *
R   * 14 (ground). Voltage reading is :                 *
R   *****************************************************
R       |   |
R       |   |        ----------------------------------------------------
R       |   |        | Replace AP/FD pitch computer No 1 [26] (No 2     |
R       | 10V±2V-----| [27]).                                           |
R       |            ----------------------------------------------------
R    +6,5V±1.5V
R       |            ----------------------------------------------------
R       -------------| Replace pitch feel sensor [23]                   |
R                    ----------------------------------------------------
```

Chart 107

```
*************************************
* NO INHIBITION OF TRIM 1 (2)       *
* OPERATION IN AUTO TRIN MODE WITH  *
* ANGLE OF ATTACK GREATER THAN OR   *
* EQUAL TO 16 DEGREES.              *
*************************************


****************************************************
* Disengage ELECTRIC TRIM 1 (2) switch and engage  *
* ELECTRIC TRIM 2 (1) switch                       *
* The two ANTISTALL SYSTEM 1 and 2 switches are in *
* ON position                                      *
* On circuit breaker panels 1-213 and 3-213        *
* respectively, circuit breakers G292, map ref M17,*
* and G294, map ref. B9 are tripped. Captain's and *
* First Officer's angle of attack indicators dis-  *
* play an angle of attack greater than or egual to *
* 16 degrees.                                      *
* Operate datum adjust unit AUTOPILOT toggle switch*
* in DOWN direction.                               *
* Check that trim does not operate.                *
****************************************************
    |   |
    |   |             ---------------------------------------------------
   NO  YES-----------| Replace Electric Trim computer No 1 [1] (No 2    |
    |                | [2])                                             |
    |                 ---------------------------------------------------
    |                 ---------------------------------------------------
    |                | Refer to safety flight control trouble shooting  |
    -----------------| Ref. 27-39-00                                    |
                      ---------------------------------------------------
```

Chart 108

```
R   **************************************
R   * IN AUTOTRIM MODE, FAILURE OF TRIM  *
R   * OPERATION ORDER FOLLOW-UP FUNCTION *
R   **************************************


R   ***************************************************
R   * For test purposes, replace Electric trim computer *
R   * No 1 [1] (No 2 [2]).                             *
R   * Engage ELECTRIC TRIM 1 (2) switch.               *
R   * Engage AP1 (AP2) switch.                         *
R   * Operate datum adjust unit AUTOPILOT toggle switch *
R   * in NOSE DOWN direction and disengage AP1 (AP2)   *
R   * switch                                           *
R   * Check that control column remains in position    *
R   * taken on disengagement without any jerk.         *
R   ***************************************************
R       |   |
R       |   |          ----------------------------------------------------
R       NO  YES--------| Replace removed computer by the new one.          |
R       |              ----------------------------------------------------
R       |              ----------------------------------------------------
R       ---------------| Replace pitch feel sensor [23].                   |
R                      ----------------------------------------------------
```

Chart 109

```
R   **************************************
R   * DISENGAGE:ENT OF ELECTRIC TRIM 1   *
R   * (2) SWITCH IN AUTOTRIM MODE        *
R   * WITH AP2 (AP1) ENGAGED             *
R   **************************************

R   *****************************************************
R   * For test purposes, replace Electric Trim No 1 [1] *
R   * (No 2 [2]).                                       *
R   * Engage ELECTRIC TRIM 1 switch.                    *
R   * Engage AP2 (AP1) switch.                          *
R   * Operate datum adjust unit AUTOPILOT toggle switch *
R   * in NOSE UP direction.                             *
R   * Check that ELECTRIC TRIM 1 (2) switch remains     *
R   * engaged.                                          *
R   *****************************************************
R       |   |
R       |   |        --------------------------------------------------
R       NO  YES-------| Replace removed computer by the new one.        |
R       |            --------------------------------------------------
R       |            --------------------------------------------------
R       --------------| Replace AP/FD pitch computer No 2 [27]          |
R                    --------------------------------------------------
```

Chart 110

```
**************************************
* ELECTRIC TRIM 1 (2) SWITCH REMAINS *
* IN ON POSITION ON FAILURE OF       *
* INCIDENCE COMPARISON FUNCTION,     *
* WITH NO AP ENGAGED.                *
**************************************

*****************************************************
* For test purposes, replace Electric trim computer *
* No 1 [1] (No 2 [2]).                              *
* Engage ELECTRIC TRIM 1 (2) switch.                *
* Place ADC1 (ADC2) TEST selector switch in COMP    *
* position.                                         *
* Check that ELECTRIC TRIM 1 (2) switch returns to  *
* OFF.                                              *
*****************************************************
    |   |
    |   |       ----------------------------------------------
    NO  YES-------| Replace removed computer by the new one  |
    |               ----------------------------------------------
    |
*****************************************************
* For test purposes, replace ADC No 1 (No 2) control*
* relay [9] ([10]), then repeat operation.          *
*****************************************************
    |   |
    |   |       ----------------------------------------------
    NO  YES-------| Replace removed relay by the new one     |
    |               ----------------------------------------------
    |
    |               ----------------------------------------------
    --------------| Replace air data computer No 1 [7] (No 2 [8]) |
                    ----------------------------------------------
```

Chart 111

```
R   **************************************-------------------------------
R   * OUT-OF-TRIM SAFETY FEATURE AT      *| GROUND EQUIPMENT REQUIRED  |
R   * TAKE OFF INEFFECTIVE WITH THROTTLE *-------------------------------
R   * CONTROL LEVERS No 1 AND No 3       *| GROUND EQUIPMENT REQUIRED  |
R   * IN  MAKIMUM THRUST POSITIONS       *-------------------------------
R   **************************************| MULTIMETER                 |
R                                         -------------------------------

R   *****************************************************
R   * On ceiling panel, place ANTISTALL SYSTEM 1 (2)    *
R   * switch in ON position, place AUTOSTAB No 1 (No 2) *
R   * PITCH lever in ON position. On Captain's handwheel*
R   * press emergency flight control TEST button.       *
R   * Check if PITCH lever remains engaged.             *
R   *****************************************************
R       |   |
R       |   |          ------------------------------------------
R      YES NO--------| Replace LH (RH) landing gear weight relay [28] |
R       |            | ([29]).                                       |
R       |            ------------------------------------------
R       |                                |
R       |                               NO
R       |                                |
R       |            ------------------------------------------
R       |            | Refer to Trouble shooting for landing gear and |
R       |            | doors indicating                               |
R       |            | Ref. 32-61-00                                  |
R       |            ------------------------------------------
R       |
R   *****************************************************
R   * For test purposes, replace Electric Trim computer *
R   * No 1 [1] (No 2 [2])                               *
R   * Place ELECTRIC TRIM 1 (2) switch in ON position   *
R   * then operate trim to read an 8 degree up          *
R   * deflection. Place throttle control levers No 1 and*
R   * No 3 in maximum thrust position.                  *
R   * Check that ELECTRIC TRIM 1 (2) switch returns to  *
R   * OFF approximately 30 seconds later.               *
R   *****************************************************
R       |   |
R       |   |          ------------------------------------------
R      NO YES--------| Replace removed computer by the new one      |
R       |            ------------------------------------------
```

Chart 112 (Sheet 1 of 2)

```
R        |
R   ***************************************************
R   * Place the four throttle control levers in mid-way *
R   * position . On AFCS control unit, place AT1 (AT2)  *
R   * switch in ON position. Check that switch remains  *
R   * engaged.                                          *
R   ***************************************************
R        |   |
R        |   |          ----------------------------------------------------
R       YES NO--------| Remove autothrottle computer No 1 [30]              |
R        |            | (No 2 [31]). On connector 1C171 AA (2C 171 AA),|
R        |            | check that 28 VDC from circuit breaker [32]         |
R        |            | ([33]) is provided between terminals 5 and 3       |
R        |            | (ground).                                           |
R        |            ====================================================
R        |
R   ***************************************************
R   * Place AT1 (AT2) switch in OFF position.           *
R   * Place throttle control lever No1 in maximum thrust*
R   * position, the 3 other throttle control levers     *
R   * being in mid-way position.                        *
R   * Check that AT1 (AT2) switch can be placed in ON   *
R   * position.                                         *
R   ***************************************************
R        |   |     ---------------------------------------------------------
R       NO  YES--| Replace forward thrust microswitch box associated   |
R        |       | with throttle control lever No 1 [34].              |
R        |       ---------------------------------------------------------
R        |
R   ***************************************************
R   * On LH side (RH side) console place hold-to-test   *
R   * LIGHTS-LO-HI-TEST switch in TEST position.        *
R   * Check that Captain's (First Officer's) airspeed   *
R   * indicator speed discrepancy indicator light       *
R   * illuminates.                                      *
R   ***************************************************
R        |   |
R        |   |     ---------------------------------------------------------
R       NO  YES--| Replace forward thrust microswitch box associated   |
R        |       | with throttle control lever No3. [35].              |
R        |       ---------------------------------------------------------
R        |       ---------------------------------------------------------
R        |=======| Replace circuit breaker [36] ([37]).                 |
R        |       ---------------------------------------------------------
```

R Chart 112 (Sheet 2 of 2)

```
**************************************
* OUT-OF-TRIM SAFETY FEATURE AT TAKE *
* OFF INEFFECTIVE WITH THROTTLE      *
* CONTROL LEVERS No 2 AND No 4       *
* IN MAXIMUM THRUST POSITIONS.       *
**************************************

*****************************************************
* Place throttle control lever No 2 in maximum      *
* thrust position, the 3 other throttle control     *
* levers being in mid-way position.                 *
* Check that AT1 (AT2) switch can be placed in ON   *
* position                                          *
*****************************************************
    |   |
    |   |         ---------------------------------------------------
   NO  YES-------| Replace forward thrust microswitch box [38]      |
    |            | associated with throttle control lever No 2.     |
    |             ---------------------------------------------------
    |
*****************************************************
* Place throttle control lever No.4 in maximum      *
* thrust position, the 3 other throttle control     *
* levers being in mid-way position.                 *
* Check that AT1 (AT2) switch can be placed in ON   *
* position.                                         *
*****************************************************
    |   |
    |   |         ---------------------------------------------------
   NO  YES-------| Replace forward thrust microswitch box [39]      |
    |            | associated with throttle control lever No 4.     |
    |             ---------------------------------------------------
    |
    |             ---------------------------------------------------
    |------------| Replace Electric Trim computer No 1 [1]          |
                 | No 2 [2]).                                       |
                  ---------------------------------------------------
```

Chart 113

```
R   *************************************
R   * NO TRIM 1-TRIM 2 CHANGE OVER SIGNAL*
R   *************************************

R   *****************************************************
R   * For test purposes, replace Electric Trim computer *
R   * No 1 [1].                                         *
R   * Place ELECTRIC TRIM switches 1 and 2 in ON        *
R   * position.                                         *
R   * Press Captain's PITCH TRIM switch in UP direction *
R   * While trim operates in selected direction,        *
R   * disengage ELECTRIC TRIM switch 1.                 *
R   * Check that trim is still operating with Trim 2    *
R   * engaged.                                          *
R   *****************************************************
R       |        |
R       |        |   --------------------------------------------------
R      YES      NO---| Replace removed computer by the new one.       |
R       |            --------------------------------------------------
R       |            --------------------------------------------------
R       |------------| Replace Electric Trim computer No 2 [2].       |
R                    --------------------------------------------------
```

R Chart 114

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF.	
					MAINT. TOPIC	WIRING DIAGRAM
[1] Electric Trim Computer No 1	215 BS	4-215	1C151	Electronics Rack-LH	22-23-11 R/I	22-23-02 22-23-03 22-23-04
[2] Electric Trim Computer No 2	216 BS	4-216	2C151	Electronics Rack-RH	22-23-11 R/I	22-23-06 22-23-07 22-23-08
[3] Circuit breaker		13-215	1C162	Map Ref C5	24-50-00 R/I	22-23-01
[4] Circuit breaker		13-216	2C162	Map Ref E16	24-50-00 R/I	
[5] Captain's PITCH TRIM UP/DOWN switch		8-211		Captain's Handwheel	22-23-62 R/I	22-23-03 22-23-04
[6] F/O PITCH TRIM UP/DOWN switch		4-212		F/O handwheel	22-23-62 R/I	22-23-06 22-23-07
[7] Air data computer No 1	215 BS	6-215	1F 71	Electronics Rack-LH	34-00-00 R/I	22-23-02
[8] Air data computer No 2	216BS	6-216	2F 71	Electronics Rack-RH	34-00-00 R/I	22-23-06
[9] ADC1 control relay	215 BS	6-215	1F 93	Electronics rack-LH	34-xx-xx	34-10-01
[10] ADC2 control relay	216 BS	6-216	2F 93	Electronics rack-RH	34-xx-xx	34-10-01
[11] Trim actuator	121 DB	122	C152	Integral Pitch Trim	22-23-61	22-23-02 22-23-06
[12] Captain's UP switch No 1 (PITCH TRIM)		8-211	1C157	Captain's Handweel	22-23-62 R/I	

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ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	WIRING DIAGRAM
[13] Captain's UP switch No 2 (PITCH TRIM)		8-211	2C157	Captain's handwheel	22-23-62 R/I	
[14] Captain's Down switch No 1 (PITCH TRIM)		8-211	1C159	Captain's handweel	22-23-62 R/I	
[15] Captain's Down switch No 2 (PITCH TRIM)		8-211	2C159	Captain's handweel	22-23-62 R/I	
[16] F/O's UP switch No 1 (PITCH TRIM)		4-212	1C158	F/O's handweel	22-23-62 R/I	
[17] F/O's UP switch No 2 (PITCH TRIM)		4-212	2C158	F/O's handweel	22-23-62 R/I	
[18] F/O's DOWN switch No 1		4-212	1C160	F/O's handweel	22-23-62 R/I	
[19] F/O's Down switch No 2		4-212	2C160	F/O's handweel	22-23-62 R/I	
[20] Circuit breaker		13-215	1C163	Map Ref E5	24-50-00 R/I	22-23-01
[21] Circuit breaker		13-216	2C163	Map Ref A16	24-50-00 R/I	22-23-01
[22] Electric Trim control unit		4-211	C153	Ceiling panel	22-21-21 R/I	22-23-03 22-23-04 22-23-06 22-23-07
[23] Pitch feel sensor	211 HF	122	C154	Flight Cpt Underfloor	22-23-81 R/I	22-23-02 22-23-06

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	MANUAL REF. WIRING DIAGRAM
[24] Circuit breaker		1-213	1C161	Map Ref Q11	24-50-00 R/I	22-23-01
[25] Circuit breaker		5-213	2C161	Map Ref B13	24-50-00 R/I	22-23-01
[26] AP/FD pitch computer No 1	215 BS	4-215	1C 12	Electronics Rack LH	22-12-11 R/I	22-23-03 22-23-04
[27] AP/FD pitch computer No 2	216 BS	4-216	2C 12	Electronics Rack RH	22-12-11 R/I	22-23-06 22-23-07
[28] LH landing gear weight relay	123 AB	2-123	G303	Aft underfloor racking	32-00-00 R/I	22-23-03 22-23-04
[29] RH landing gear weight relay	123 AB	3-123	G312	Aft underfloor racking	32-00-00 R/I	22-23-06 22-23-07
[30] Autothrottle computer No 1	215 BS	4-215	1C171	Electronics Racks LH	22-31-11 R/I	22-31-01
[31] Autothrottle computer No 2	216 BS	4-216	2C171	Electronics Rack RH	22-31-11 R/I	22-31-01
[32] Circuit breaker		1-213	1C180	Map Ref Q12	24-50-00 R/I	22-31-01
[33] Circuit breaker		5-213	2C180	Map Ref A 14	24-50-00 R/I	22-31-01
[34] Forward thrust microswitch box No 1		9-211	1K1548	Centre console	76-11-19 R/I	22-31-01

R

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	MANUAL REF. WIRING DIAGRAM
[35] Forward Thrust microswitch box No 3		9-211	3K1548	Centre console	76-11-19 R/I	22-31-01
[36] Circuit breaker		1-213	1C 19	Map Ref Q14	24-50-00 R/I	22-31-01
[37] Circuit breaker		5-213	2C 19	Map Ref A12	24-50-00 R/I	22-31-01
[38] Forward thrust microswitch box No 2		9-211	2K1548	Centre console	76-11-19 R/I	22-31-01
[39] Forward thrust microswitch box No 4		9-211	4K1548	Centre console	76-11-19 R/I	22-31-01

Component Identification
Table 101

ELECTRIC TRIM - ADJUSTMENT/TEST

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

1. General

WARNING : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

The purpose of Adjustment/Test procedures described below is to check the electric trim and its functions for correct operation in all modes, with the aircraft on the ground, shock absorbers compressed.

2. Operational Test

This operational test includes the following :

- Test of the computers by means of the ITEM system
- Test of trim operation in Pilot trim.
- Test of UP-DOWN safety feature provided by actuating simultaneously Captain and First Officer PITCH TRIM switches in opposite directions.

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.470 m (14 ft. 8 in.)	
Electrical Ground Power Unit	

B. Prepare

(1) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
NOSE UC WEIGHT SW "A" SYS SUP	1-213	G 291	M16
LH UC WEIGHT SW "A" SYS SUP		G 292	M17
AUDIO WARN SYS SUP 1		W 371	M21
MWS SUP 1		W 252	N21
ADC 28 V SUP		1F 74	P12
TRIM 1 CONT		1C 161	Q11
AT CONT		1C 180	Q12
AP/FD SYS 1 CONT		1C 17	Q13
AFCS 1 CONT		1C 19	Q14
FLT CONT POSN IND CONT		C 83	R11
AFCS TEST 1 28 V SUP		1C 383	R12
ADC 1 26V SUP	2-213	1F 78	A 2
LAT ACCLMTR 1 26V SUP		1C 42	A 4
FLT CONT POSN IND 26V 400Hz SUP		C 84	B 4
1ST PLT ADC INST SUP		1F 75	B 3
AP/FD SYS1 SUP		1C 20	C 5
AUTOSTAB 1 COMP SUP		1C 37	E 5
ADC 1 115 V SUP		1F 73	F 3
RH UC WEIGHT SW "B" SYS SUP	3-213	G 294	B 9
NOSE UC W/SW "B" SUP		G 296	D 8
AP/FD SYS 2 CONT	5-213	2C 17	A11
AFCS 2 CONT		2C 19	A12
AT CONT		2C 180	A14
TRIM 2 CONT		2C 161	B13
AUDIO WARN SYS SUP 2		W 372	C17
MWS SUP 2		W 251	D15

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AFCS TEST 2 28 V SUP		2C 383	F11
ADC 2 28 V SUP		2F 74	F12
AP/FD COMP 1 SUP	13-215	1C 18	A 5
TRIM COMP 1 SUP		1C 162	C 5
AFCS TEST 1 115 V SUP		1C 384	D 6
TRIM SYNCHRO SYS 1 SUP		1C 163	E 5
2ND PLT ADC INST SUP	13-216	2F 75	A14
TRIM SYNCHRO SYS 2 SUP		2C 163	A16
AP/FD SYS 2 SUP		2C 20	A17
LAT ACCLMTR 2 26 V SUP		2C 42	B16
AUTOSTAB 2 COMP SUP		2C 37	D17
TRIM COMP 2 SUP		2C 162	E16
ADC2 26V SUP		2F 78	F14
ADC 2 115 V SUP		2F 73	F15
AFCS TEST 2 115 V SUP		2C 384	F17
AP/FD COMP 2 SUP		2C 18	F18

(2) Set the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-216	X 345	G 4

(3) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(4) At Flight Engineer's station, on EQUIPMENT BAY COOLING panel, make certain that electronics rack ventilation operates (Ref. 21-21-00).

(5) Pressurize Blue hydraulic system (Ref. 29-12-00, Servicing).

(6) Set Flight Controls in mechanical mode (Ref. 27-00-00, Servicing).

(7) In flight compartment, on centre console

(a) On ADC control panel, make certain that TEST selector switches are in NORM position.

(b) Place ADC1 and ADC2 switches in ON position.

(c) If ADC1 and ADC2 caption lights illuminate, press them to reset.

(d) Set pitch trim control wheel to 0°.

(e) Place the four throttle control levers in flight idle position.

C. Test of the Computers by means of the ITEM System

NOTE : It is recommended to energize the computers three minutes (approximately) before starting this test.

(1) At Flight Engineer's station, on ITEM control and indicator panel.

(a) Place both IFM-OFF-TEST switches in TEST position.

NOTE : These two switches are of the pull-to-unlock type.

(b) Place FLIGHT-TEST ALL-TEST UNIT selector switch in TEST UNIT position.

(b1) Check that ITEM and TEST indications appear on side 1 windows 3 and 4 and side 2 windows 7 and 8 respectively.

(b2) After 2 minutes 30 seconds approximately, check that TEST indication is replaced by PASS indication at the end of autotest and initialization.

NOTE : FAIL indication display instead of TEST indication means failure of either or both ITEM computers.

(c) Place then hold side 1 SELECT-START switch in SELECT position.

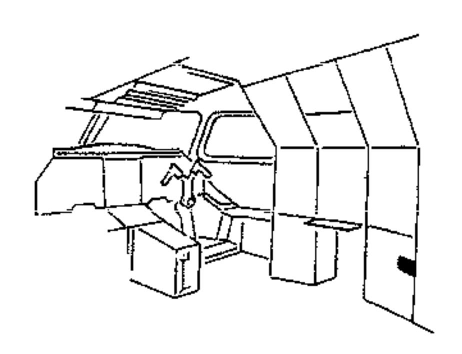
(d) Display ET (Electric Trim) indication in window 3 (7), to replace ITEM indication.

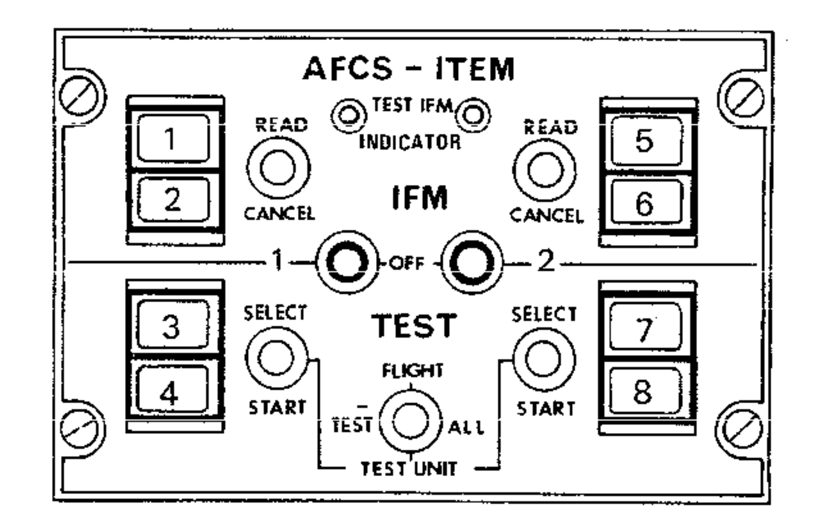
NOTE : The indications associated with the AFCS systems appear regularly in the following sequence : SFC, AP.P, AP.A, AT, AS.P, AS.R, AS.Y, ET, WLD on window 3 or 7, depending on the side selected.

(e) When ET appears on window 3 (7), release SELECT/START switch, which returns to middle position (spring loaded mechanism).

(f) Place SELECT-START switch in START position, then release it.

(f1) Check that ET indication remains displayed on window 3 (7).





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ITEM Control and Indicator Panel
Figure 501

(f2) Check that TEST indication appears on window 4 (8).

(f3) Approximately 6 minutes and 30 seconds later PASS indication must replace TEST indication on window 4 (8).

NOTE : PASS indication means that lane 1 (lane 2) computer is in correct operating condition. If COMP indication appears in lieu of PASS indication, lane 1 (lane 2) computer is not in correct operating condition.

(g) Place side 1 IFM-OFF-TEST selector switch in OFF position.

(g1) On windows 3 and 4, check that ET and PASS indications are no longer displayed.

(h) Repeat the same test on side 2, as described in paragraph 2. C. (1) (c) through 2. C. (1) (f) (f3). For lane 2 trim computer, ET, TEST, and then PASS indications will appear on windows 7 and 8 respectively. The results must be identical.

(i) Place side 2 IFM-OFF-TEST selector switch in OFF position.

(i1) Check that ET and PASS indications have disappeared from windows 7 and 8.

(j) Place FLIGHT-TEST ALL-TEST UNIT selector switch in FLIGHT position.

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D. Test of Trim Operation in Pilot Trim

(1) Make certain that pitch trim control wheel is in 0° position. The system must have been energized at least three minutes before testing ; on overhead panel, engage switch 2 of ELECTRIC TRIM control unit.

(a) The switch must remain engaged.

(b) On master warning panel, on overhead panel, TRIM red warning light extinguishes.

(c) On centre console, pitch trim control wheel must not move.

(2) On Captain control column handwheel, hold PITCH TRIM switch in DOWN position, then release it :

(a) Pitch trim control wheel rotates in the nose down sense, thus triggering the rattle aural warning.

(b) On ICOVOL indicator (Flight Control Surface Position Indicator), check that the elevons are deflecting in the direction selected.

(3) On Captain control column handwheel, place PITCH TRIM switch in UP position, then release it :

(a) Pitch trim control wheel rotates in the nose up sense, thus energizing the rattle aural warning.

(b) On ICOVOL indicator, check that the elevons are deflecting in the direction selected.

(4) On First Officer control column handwheel, repeat operations described on Captain column from paragraph 2. D. (2) through 2. D. (3) (b). The results must be identical.

(5) Place pitch trim control wheel in 0° position.

(6) Engage switch 1 of ELECTRIC TRIM control unit.

(a) The switch must remain engaged.

(7) On Captain and First Officer control column handwheels, repeat operations described for trim 2 (from paragraph 2. D. (2) through 2. D. (4)). The results must be identical.

(8) Manually disengage both switches 1 and 2 of ELECTRIC TRIM control unit.

(a) On master warning panel, red TRIM warning light must illuminate.

(b) The single stroke gong sounds.

(9) On master warning panel, press TRIM warning light in order to cancel warning.

(10) Place pitch trim control wheel in 0° position.

E. Test of UP-DOWN Safety Feature

(1) On overhead panel, engage switch 1 of ELECTRIC TRIM control unit.

(a) The switch must remain engaged.

(b) On centre console, pitch trim handwheel must not move.

(2) On Captain control column handwheel, place PITCH TRIM switch either in UP or in DOWN position.

(3) On First Officer control column handwheel, place PITCH TRIM switch in the position opposite to the one selected on Captain control column handwheel.

(a) On ELECTRIC TRIM control unit, switch 1 (2) must disengage.

(b) On master warning panel, TRIM red warning light must illuminate.

(c) Single stroke gong sounds.

(4) On master warning panel, press TRIM warning light to cancel warning.

(5) On centre console, check that pitch trim control wheel is declutched.

(6) On ELECTRIC TRIM control unit, engage switch 2 and repeat operations described from 2. E. (1) (a) through 2. E. (5), taking into account the information given in brackets. The results must be identical.

F. Close-Up

(1) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-216	X 345	G 4

(2) On centre console, place pitch trim control wheel in 0° position.

(3) On ADC control panel, place both ADC1 and ADC2 switches in OFF position.

(4) On overhead panel, place both BLUE INVERTER and GREEN INVERTER switches in PWR OFF position.

(5) Shut down Blue hydraulic system (Ref. 29-12-00, Servicing).

(6) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(7) Remove access platform.

3. Functional Test

This functional test comprises the following :

- Test of the computers by means of the ITEM system
- Test of the electrical zero of electro-mechanical units (actuator and pitch feel sensor)
- Test of pilot trim function, which includes two checks (trim rotation range and speed)
- Test of stabilization function
- Test of disconnection following angle-of-attack warning
- Test of safety feature at take-off
- Test of Trim 1 - Trim 2 automatic change-over
- Test of override and of declutched position
- Test of Autotrim function, which includes four checks (trim - AP interconnection, autotrim in normal mode, autotrim in turbulence mode and autotrim inhibition by means of SFC).

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.470 m (14 ft. 8 in.)	
Electrical Ground Power Unit	
Chronometer	

B. Prepare

NOTE : Each functional test or check may be performed independently.
The first part of job preparation, from paragraph 3.B. (1) to 3.B. (7) (c) is common to each.
For AUTOTRIM function, supplementary preparation from paragraph 3.B. (8) to 3.B. (10) (f) is necessary.

(1) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
COMPASS COUPLER SYS 1 SW SUP 1	1-213	1F 134	F14
NOSE UC WEIGHT SW A SYS SUP		G 291	M16
LH UC WEIGHT SW A SYS		G 292	M17

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
SUP			
RH UC WEIGHT SW & DOWN LOCK A SYS SUP		G 295	M18
AUDIO WARN SYS SUP 1		W 371	M21
MWS SUP 1		W 252	N21
ADC 28 V SUP		1F 74	P12
WARN & LDG DISPLAY 1 SUP 1		1C 192	P13
WARN & LDG DISPLAY 1 SUP 2		1C 193	P14
TRIM 1 CONT		1C 161	Q11
AT CONT		1C 180	Q12
AP/FD SYS 1 CONT		1C 17	Q13
AFCS 1 CONT		1C 19	Q14
FLT CONT POSN IND CONT		C 83	R11
AFCS TEST 1 28 V SUP		1C 383	R12
SAFETY FLT CONT No.1 SUP		1C 651	S20
ADC 1 26 V SUP	2-213	1F 78	A 2
LAT ACCLMTR 1 26 V SUP		1C 42	A 4
FLT CONT POSN IND 26V 400 Hz SUP		C 84	B 4
1ST PLT ADC INST SUP		1F 75	B 3
AP/FD SYS1 SUP		1C 20	C 5
AUTOSTAB 1 COMP SUP		1C 37	E 5
ADC 1 115 V SUP		1F 73	F 3
LDG DISPLAY SYS 1 SUP		1C 191	F 4
COMPASS COUPLER 1 SUP		1F 130	F 8
LH UC WEIGHT SW & DOWN LOCK "B" SYS SUP	3-213	G 293	B 8
RH UC WEIGHT SW "B" SYS SUP		G 294	B 9
NOSE U/C W/SW "B" SUP		G 296	D 8
AP/FD SYS 2 CONT	5-213	2C 17	A11
AFCS 2 CONT		2C 19	A12
AT CONT		2C 180	A14
TRIM 2 CONT		2C 161	B13
AUDIO WARN SYS SUP 2		W 372	C17
MWS SUP 2		W 251	D15
SAFETY FLT CONT No.2 SUP		2C 651	D17

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
MWS SUP 2		W 251	D15
AFCS TEST 2 28 V SUP		2C 383	F11
ADC 2 28 V SUP		2F 74	F12
AP/FD COMP 1 SUP	13-215	1C 18	A 5
AFCS MODE SYS 1 LTS SUP		1C 273	B 5
COMPASS COUPLER 2 STBY SUP		2F 131	B 7
TRIM COMP 1 SUP		1C 162	C 5
AFCS TEST 1 115 V SUP		1C 384	D 6
TRIM SYNCHRO SYS 1 SUP		1C 163	E 5
SAFETY FLT CONT COMP No.1 115 V SUP		1C 652	E 6
SAFETY FLT CONT COMP No.1 26 V SUP		1C 653	F 6
2 ND PLT ADC INST SUP	13-216	2F 75	A14
TRIM SYNCHRO SYS 2 SUP		2C 163	A16
AP/FD SYS 2 SUP		2C 20	A17
LAT ACCLMTR 2 26 V SUP		2C 42	B16
SAFETY FLT CONT COMP No.2 26 V SUP		2C 653	C16
SAFETY FLT CONT COMP No.2 115 V SUP		2C 652	C17
COMPASS COUPLER 2 NORM SUP		2F 130	D15
AUTOSTAB 2 COMP SUP		2C 37	D17
TRIM COMP 2 SUP		2C 162	E16
AFCS MODE SYS 2 SUP	15-216	2C 273	E17
ADC2 26V SUP		2F 78	F14
ADC 2 115 V SUP		2F 73	F15
AFCS TEST 2 115 V SUP		2C 384	F17
AP/FD COMP 2 SUP		2C 18	F18
COMPASS COUPLER SYS 2 SW SUP		2F 134	A21

(2) Set the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-216	X 345	G 4

(3) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(4) At Flight Engineer station, on EQUIPMENT BAY COOLING panel, make certain that electronics racks ventilation operates (Ref. 21-21-00).

(5) Pressurize Blue hydraulic system (Ref. 29-12-00, Servicing).

(6) Set Flight Controls in Blue electrical mode (Ref. 27-00-00, Servicing).

(7) In flight compartment, on centre console.

(a) On ADC control panel, check that TEST selector switches are in NORM position.

(b) Place ADC1 and ADC2 switches in ON position.

(c) If ADC1 and ADC2 caption lights illuminate, press them to reset.

(d) Place pitch trim handwheel in 0° position.

(e) Place the four throttle control levers in flight idle position.

NOTE : The following additional paragraphs
R must be included for the test of the auto-
R trim function dealt with in paragraph 3.K.,
R as this function requires AP engagement.

(8) Pressurize Green hydraulic system. (Ref. 29-11-00, Servicing).

(9) At Flight Engineer station :

(a) Energize INS No.1 and No.2 (Ref. 34-45-00, Adjustment/Test).

R R NOTE : The AP/FD cannot be engaged until G flag disappears from each ADI.

(b) On COMPASS unit, place the two DG MAG switches in MAG position.

(10) In flight compartment

(a) On Captain instrument panel, place ATT/INS1 - INS3 switch in INS 1 position.

(b) On First Officer instrument panel, place ATT/INS2 - INS3 switch in INS2 position.

(c) On centre panel 6-211, make certain that AFCS MODES rotary switch is in BRIGHT position.

(d) On both sides of AFCS control unit, place RAD/INS switches in INS position.

(e) On overhead panel,

(e1) On flight control unit, place both ANTI STALL1 and ANTI STALL2 switches in ON position.

(e2) Engage PITCH-ROLL-YAW switches of both AUTOSTAB No.1 and AUTOSTAB No.2 control units.

- The six switches must remain engaged.
- On flight control unit, SYST1 FAIL and SYST2 FAIL indicator lights must extinguish.

(f) On centre console, make certain that the datum adjust unit AUTOPILOT TURN knob is in neutral position and that NOSE UP/NOSE DOWN switch is in neutral position.

C. Test of the Computers by Means of the ITEM System

(1) The computers having been energized for three minutes carry out test as described in paragraph 2. C. (1) of Operational Test.

D. Test of the Electrical Zero of Electro-Mechanical Units

NOTE : Before starting these tests, make certain that pitch trim control wheel is in 0° position.

(1) Test of trim actuator electrical zero.

(a) Remove blanking cap from ZA test socket of each trim computer.

(b) Measure direct voltage between pins ZA11 and ZA14 (ground) of each computer.

(b1) Voltage must not reach 500 m VDC (absolute value).

(2) Test of pitch feel sensor electrical zero.

(a) Measure direct voltage between pins ZA6 and ZA14 (ground) of each computer.

(a1) Voltage must not reach 400 m VDC (absolute value).

(b) Measure direct voltage between pins ZB6 and ZB14 (ground) of each computer.

(b1) Voltage must not reach 400 m VDC (absolute value).

(c) Place blanking caps on ZA and ZB sockets of each computer.

E. Test of Pilot Trim Function

(1) Test of trim operation range

(a) On centre console, make certain that pitch trim control wheel is in 0° position.

(b) On overhead panel, engage switch 1 of ELECTRIC TRIM control unit.

(b1) The switch must remain engaged.

(b2) On centre console, pitch trim control wheel must not move.

WARNING : RELEASE CAPTAIN AND FIRST OFFICER PITCH TRIM SWITCHES WHEN PITCH TRIM HANDWHEEL REACHES UP OR DOWN MECHANICAL STOP.

(c) On Captain control column handwheel, place and hold PITCH TRIM switch in UP position.

(c1) Pitch trim control wheel rotates in nose up sense to reach the 15° mechanical stop, thus triggering the rattle aural warning.

(d) If the mechanical stop is reached, switch 1 (2) of ELECTRIC TRIM control unit must disengage; release PITCH TRIM switch.

(d1) On master warning panel, TRIM red warning light must illuminate.

(d2) The single stroke gong sounds.

NOTE : In the following tests, the warnings triggered will not be mentioned.

(e) On master warning panel, press TRIM warning light in order to cancel warning.

(f) On ICOVOL indicator, an elevon deflection of approximately 15° in nose up direction must be indicated.

(g) On centre console, bring pitch trim control wheel back to 0 degrees.

(h) Engage switch 1 (2) of ELECTRIC TRIM control unit.

(h1) The switch must remain engaged.

(i) On First Officer control column handwheel, place and hold PITCH TRIM switch in DOWN position.

(i1) Pitch trim control wheel rotates in nose down direction and reaches the 8 degree mechanical stop, thus triggering the rattle aural warning.

(j) If the mechanical stop is reached, switch 1 (2) of ELECTRIC TRIM control unit must disengage; release PITCH TRIM switch.

(k) On master warning panel, press TRIM warning light to cancel warning.

(l) On ICOVOL indicator, an elevon deflection of approximately 8° in nose down direction must be indicated.

(m) Place pitch trim control wheel in 0° position.

(n) Engage switch 2 of ELECTRIC TRIM control unit and carry out operations described from 3. E. (1) (b) (b1) through 3. E. (1) (m), using Captain control column handwheel PITCH TRIM switch to cause nose down deflection and First Officer control column handwheel PITCH TRIM switch to cause nose up deflection. Take into account information in brackets. The results must be identical.

(2) Test of trim rotation speed

(a) On centre console, make certain that pitch trim control wheel is in 0° position.

(b) On overhead panel, engage switch 1 of ELECTRIC TRIM control unit.

(b1) The switch must remain engaged.

(c) On Captain control column handwheel place then hold PITCH TRIM switch in UP position during 20 seconds.

(d) On pitch trim control wheel indicator, the trim rotation must be approximately 10° in nose up direction.

(e) On ICOVOL indicator, an elevon deflection of approximately 10° in nose up direction must be indicated.

(f) Disengage switch 1 (2) of ELECTRIC TRIM control unit.

(g) Place pitch trim control wheel in 0° position.

(h) Engage switch 2 of ELECTRIC TRIM control unit and repeat operations described from 3. E. (2) (b) (b1) through 3. E. (2) (g), taking into account the information in brackets.

F. Test of Stabilization Function

(1) On centre console

(a) Make certain that pitch trim control wheel is in 0° position.

(b) On ADC control panel, place ADC2 switch in OFF position, ADC 1 switch being in ON position.

(2) Trip safety and tag the following circuit breaker :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
STICK SHAKER SUP	1-213	W 513	P15

(3) On overhead panel, engage switch 1 of ELECTRIC TRIM control unit.

(a) The switch must remain engaged.

(4) On ADC control panel.

(a) Hold ADC1 (ADC2) caption light pressed and place TEST selector switch of ADC1 (ADC2) in 1 position.

(5) On centre console, pitch trim control wheel rotates in nose down sense then stabilizes at 3° 30 min. approximately.

(a) Check value on pitch trim control wheel indicator and on ICOVOL indicator.

(6) Hold ADC1 (ADC2) caption light and when Captain (First Officer) machmeter indicates Mach 0.63, place TEST selector switch of ADC1 (ADC2) in position 2.

(7) On centre console pitch trim control wheel rotates in nose up direction to stabilize at 11° 30 min. approximately.

(a) Check value on pitch trim control wheel indicator and on ICOVOL indicator.

(8) Disengage switch 1 (2) of ELECTRIC TRIM control unit.

(a) On master warning panel, red TRIM warning light

must illuminate.

(b) The single stroke gong sounds.

(9) On master warning panel, press TRIM indicator light in order to cancel warning.

(10) Place pitch trim control wheel in 0° position.

(11) On ADC control panel,

(a) Place ADC1 switch in OFF position and the corresponding TEST selector switch in NORM position.

(b) Make certain that ADC2 TEST selector switch is in NORM position ; place ADC2 switch in ON position.

(b1) If ADC2 caption light illuminates, reset by depressing caption light.

(12) On overhead panel, engage switch 2 of ELECTRIC TRIM control unit ; repeat operations described in 3. F. (3) (a) through 3. F. (10). The results must be identical.

(13) On ADC control panel,

(a) Place ADC 2 TEST selector switch in NORM position and ADC 1 switch in ON position.

(a1) Wait for 1 minute approximately then reset by pressing ADC 1 and ADC 2 caption lights ; these must extinguish.

(14) Remove safety clip and tag and reset the following circuit breaker :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
STICK SHAKER SUP	1-213	W 513	P15

B G. Check of Disconnection of Both Trim Channels Following
B ADC Comparison Warning

(1) On centre console

(a) Make certain that pitch trim control wheel is in 0° position.

(b) On ADC control panel, make certain that ADC1 and ADC2 switches are in ON position and associated TEST selector switches are in NORM position.

(2) On overhead panel, engage both switches 1 and 2 of ELECTRIC TRIM control unit.

(3) On ADC control panel, place ADC1 TEST selector switch in COMP position.

(a) TEST indicator light illuminates in blue.

(b) Both switches 1 and 2 of ELECTRIC TRIM control unit must disengage.

(c) On master warning panel, TRIM and ADS red warning lights must illuminate.

(d) Single stroke gong sounds.

(4) On master warning panel, press TRIM and ADS warning lights in order to cancel warnings.

(5) On ADC control panel.

(a) Place ADC1 TEST selector switch in NORM position

(b) Reset by pressing then releasing ADC1 caption light. ADC1 amber caption light must extinguish.

H. Check of Safety Feature at Take-Off

(1) On centre console,

(a) Make certain that pitch trim control wheel is in 0° position.

(b) Make certain that the four throttle control levers are in minimum stop position.

(c) On ADC control panel, make certain that ADC1 and ADC2 switches are in ON position and that associated TEST selector switches are in NORM position.

(2) On overhead panel, engage switch 1 of ELECTRIC TRIM control unit.

(a) The switch must remain engaged.

(3) On centre console, hold either Captain or First Officer PITCH TRIM switch in UP position in order to place pitch trim handwheel in 8° position.

(4) Manually bring throttle control lever No.1 to maximum mechanical stop.

(a) Switch 1 (2) of ELECTRIC TRIM control unit must disengage.

(b) On master warning panel, red TRIM warning must illuminate.

(c) Single stroke gong sounds.

(5) On master warning panel, press TRIM indicator light to cancel warning.

(6) Place throttle control lever No.1 on low mechanical stop.

(7) Engage switch 1 (2) of ELECTRIC TRIM control unit and repeat operations described from 3. H. (4) through 3. H. (6) with each of the three remaining throttle control levers. The results must be identical.

(8) Engage switch 2 of ELECTRIC TRIM control unit and repeat test as described from 3. H. (2) (a) through 3. H. (7), using the information given in brackets. The results must be identical.

(9) Place pitch trim control wheel in 0° position.

I. Test of Trim 1 = Trim 2 Changeover

(1) On centre console

(a) Make certain that pitch trim control wheel is in 0° position.

(b) On ADC control panel, make certain that ADC1 and ADC2 switches are in ON position and that associated selector switches are in NORM position.

(2) On ceiling panel, engage both switches 1 and 2 of ELECTRIC TRIM control unit.

(a) Both switches must remain engaged.

(3) On Captain control column handwheel, place then hold PITCH TRIM switch in UP position.

(a) Check on pitch trim control wheel indicator that pitch trim control wheel rotates in nose up sense.

(4) Disengage switch 1 of ELECTRIC TRIM control unit.

(a) Pitch trim control wheel keeps rotating in nose up sense.

(5) On Captain control column handwheel, release PITCH TRIM switch.

(a) Pitch trim control wheel stops rotating.

(6) Place pitch trim control wheel in 0° position.

J. Check of Override and of Declutched Position

(1) On centre console,

(a) Make certain that pitch trim control wheel is in 0° position.

(b) On ADC control panel, make certain that ADC1 and ADC2 switches are in ON position and that associated TEST selector switches are in NORM position.

(2) On overhead panel, engage switch 1 of ELECTRIC TRIM control unit.

(a) The switch must remain engaged.

(3) On Captain control column handwheel, press then hold PITCH TRIM switch in UP position.

(4) Manually stop trim control wheel, which is rotating.

(a) Both switches 1 and 2 of ELECTRIC TRIM control unit must disengage.

(5) On Captain control column handwheel, release PITCH TRIM switch.

(a) On master warning panel, red TRIM warning light must illuminate.

(b) Single stroke gong sounds.

(6) On master warning panel, press TRIM indicator light to cancel warning.

(7) Check that pitch trim control wheel is declutched ; place it in 0° position.

K. Test of Autotrim Function

NOTE : Take into account the additional preparation needed to carry out the test of this function (Refer to Prepare, from 3. B. (7) through 3. B. (10) (f).

(1) Test of TRIM - AP Interconnection

(a) On centre console,

(a1) Make certain that pitch trim control wheel is in 0° position.

(a2) On ADC control panel, make certain that ADC1 and ADC2 switches are in ON position and that associated TEST selector switches are in NORM position.

(b) On overhead panel, engage switches 1 and 2 of ELECTRIC TRIM control unit.

(b1) Both switches must remain engaged.

(c) On AFCS control unit, engage AP1 (AP2) switch.

(c1) The switch must remain engaged.

(c2) The associated green indicator light must illuminate.

(c3) HDG HOLD and PITCH HOLD push-buttons must illuminate.

NOTE : Control column may move ; in such case, cancel motion by means of NOSE UP-NOSE DOWN switch of the datum adjust unit located on centre console.

(d) Wait until AP and TRIM are stabilized.

(e) Disengage switch 1 of ELECTRIC TRIM control unit.

(e1) AP1 (AP2) switch must remain engaged.

(f) Disengage switch 2 of ELECTRIC TRIM control unit.

(f1) AP1 (AP2) switch returns to OFF.

(f2) On master warning panel, the red TRIM warning light illuminates.

(f3) Single stroke gong sounds.

(f4) On each W & LD indicator, steady red AP warning light illuminates.

(f5) Cavalry charge aural warning sounds for one second.

(g) On either W & LD indicator, press AP warning light in order to cancel warning.

(h) On master warning panel, press TRIM warning light to cancel warning.

NOTE : In the following tests, warning triggering will be disregarded ; only warning cancellation will be mentioned.

(i) Engage both switches 1 and 2 of ELECTRIC TRIM control unit and repeat operations described from paragraph 3. K. (1) (b) (b1) through 3. K. (1) (h), taking into account the information in brackets. The results must be identical.

(2) Test of autotrim function in normal mode, with measurement of operation rate.

(a) Make certain that pitch trim control wheel is in 0° position.

(b) Engage both switches 1 and 2 of ELECTRIC TRIM control unit.

(b1) Both switches must remain engaged.

(c) On AFCS control unit, engage AP1 (AP2) switch.

(c1) The switch must remain engaged.

(c2) The associated green AP indicator light associated with switch must illuminate.

(c3) PITCH HOLD and HDG HOLD mode selection pushbuttons must illuminate.

(d) Wait until AP and TRIM are stabilized.

(e) Check that both PITCH TRIM switches of Captain and

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First Officer control column handwheels are inoperative in UP and DOWN positions.

(e1) Pitch trim control wheel must not move.

(e2) Both switches 1 and 2 of ELECTRIC TRIM control unit must remain engaged.

(f) On datum adjust unit, place then hold NOSE UP-NOSE DOWN switch in NOSE UP position for 20 seconds.

(f1) On pitch trim control wheel indicator, trim rotation displayed must be approximately 8° in nose up sense.

(f2) On ICOVOL indicator, indicated elevon deflection must be approximately 8° in nose up sense.

(g) Place then hold NOSE UP-NOSE DOWN switch in NOSE DOWN direction to set trim to 0°.

(h) Disengage switch 1 of ELECTRIC TRIM control unit.

(h1) AP1 (AP2) switch must remain engaged.

(i) On datum adjust unit, repeat operations described from 3. K. (2) (f) to 3. K. (2) (g) (g2). The results must be identical.

(j) On AFCS control unit, disengage AP1 (AP2) switch.

(j1) On autopilot disengagement, Captain and First Officer control columns must remain in the same acquired position, without any jerk.

(k) On either W & LD indicator, press AP warning light to cancel warning.

(l) Engage switch 1 of ELECTRIC TRIM control unit and repeat operations described from 3. K. (2) (c) through 3. K. (2) (k), taking into account information given in brackets. The results must be identical.

(m) Place pitch trim control wheel in 0° position.

(3) Test of autotrim function in turbulence mode, with

measurements of operation rate.

(a) On centre console, make certain that pitch trim control wheel is in 0° position.

(b) Engage switch 1 of ELECTRIC TRIM control unit.

(b1) The switch must remain engaged.

(c) On AFCS control unit engage AP1 (AP2) switch.

(c1) The switch must remain engaged.

(c2) Associated green AP indicator light must illuminate.

(c3) HDG HOLD and PITCH HOLD push-buttons must illuminate.

(d) On AFCS control unit, press TURB push-button to select TURB mode.

(d1) TURB push-button must illuminate.

(d2) HDG HOLD and PITCH HOLD push-buttons must extinguish.

(e) On datum adjust unit, place NOSE UP-NOSE DOWN switch in NOSE UP position for 20 seconds.

(e1) On pitch trim control wheel indicator trim rotation must be 5° approximately in nose up direction.

(e2) On ICOVOL indicator, elevon deflection must be 5° approximately in nose up direction.

(f) Place NOSE UP-NOSE DOWN switch in NOSE DOWN direction to set trim to 0°.

(g) Disengage switch 1 of ELECTRIC TRIM control unit.

(g1) AP1 (AP2) switch must remain engaged.

(h) On datum adjust unit, repeat operations described from 3. K. (3) (e) through 3. K. (3) (f) (f2). The results must be identical.

(i) On AFCS control unit, disengage AP1 (AP2) switch

(j) On either W & LD indicator, press AP warning light to cancel warning.

(k) Engage switch 1 of ELECTRIC TRIM control unit, and repeat operations described from 3. K. (3) (c) through 3. K. (3) (j), taking into account the information given in brackets. The results must be identical.

(l) Place pitch trim control wheel in 0° position.

(4) Test of autotrim function inhibition by means of SFC.

(a) On centre console, make certain that pitch trim control wheel is in 0° position.

(b) Engage switch 1 of ELECTRIC TRIM control unit.

(c) Disengage switch 2 of ELECTRIC TRIM control unit.

(c1) Switch 1 must remain engaged.

(d) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
LH UC WEIGHT SW "A" SYS SUP	1-213	G 292	M17
RH UC WEIGHT SW "A" SYS SUP	3-213	G 294	B 9

(e) As necessary, set LH and RH angle-of-attack sensor vanes, located in zone 113 and 114 respectively, to read an angle-of-attack less than 15° on Captain and First Officer angle-of-attack indicators.

(f) On AFCS control unit, engage AP1 switch.

(f1) The switch must remain engaged.

(f2) Associated green AP indicator light must illuminate.

(f3) HDG HOLD and PITCH HOLD push-buttons must illuminate.

(g) On datum adjust unit, place and hold NOSE UP-NOSE DOWN switch in NOSE UP direction for a few seconds.

(g1) Pitch trim control wheel must rotate.

(h) Set RH and LH angle-of-attack sensor vanes to read an angle-of-attack equal to 16° on Captain and First Officer angle-of-attack indicators.

NOTE : It is recommended to proceed slowly in order to avoid ADC warning triggering.

(i) Place NOSE UP-NOSE DOWN switch in NOSE DOWN sense.

(i1) Pitch trim control wheel must not rotate.

(j) On AFCS control unit, disengage AP1 (AP2) switch.

(k) On either W & LD indicator, press AP warning light to cancel warning.

(l) Engage switch 2 of ELECTRIC TRIM control unit.

(m) Disengage switch 1 of ELECTRIC TRIM control unit.

(m1) Switch 2 must remain engaged.

(n) On AFCS control unit, engage switch AP2 and repeat operations described from 3. K. (4) (f) (f1) through 3. K. (4) (k), taking into account the information given in brackets. The results must be identical.

(o) Disengage switch 2 of ELECTRIC TRIM control unit.

(p) On master warning panel, press TRIM warning light to cancel warning.

(q) Remove safety clips and tags and reset the following circuit breakers.

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
LH UC WEIGHT SW "A" SYS SUP	1-213	G 292	M17
RH UC WEIGHT SW "A" SYS SUP	3-213	G 294	B 9

L. Close-Up

(1) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-216	X 345	G 4

(2) On overhead panel

(a) Engage flight controls in mechanical mode (Ref. 27-00-00, Servicing).

(b) Place both BLUE INVERTER and GREEN INVERTER switches in PWR OFF position.

(c) Place both ANTI STALL SYSTEM 1 and 2 switches in OFF position.

(d) Disengage the three PITCH-ROLL-YAW switches of both AUTOSTAB No.1 and No.2 control units.

(d1) On master warning panel, depress STAB warning light to cancel warning.

(3) On centre console

(a) On ADC control panel, place both ADC1 and ADC2 switches in OFF position.

(b) Place pitch trim control wheel in 0° position.

(4) Place relevant MSU switches in OFF position to de-energize INS No.1 and INS No.2 (Ref. 34-45-00, Adjustment/Test).

(5) Shut down Blue hydraulic system (Ref. 29-12-00, Servicing) and Green hydraulic system (Ref. 29-11-00, Servicing).

(6) De-energize the aircraft electrical network and disconnect electrical ground power unit. (Ref. 24-41-00, Servicing).

(7) Remove access platform.

4. System Test

Identical to operational test

ELECTRIC TRIM COMPUTER - REMOVAL/INSTALLATION

1. General

CAUTION : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

Trim computers 1C 151 and 2C 151 are respectively mounted on shelves 4-215 and 4-216 in electronics rack. Locating pins are provided on connectors, so that computer replacement with a computer of a different type is made impossible.

Removal procedures for replacement of the computers are identi-
R cal, only one procedure is described.
R Only circuit breakers associated with computer to be removed are tripped.

2. Electric Trim Computer

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.47 m (14 ft.8 in.)	
Circuit Breaker Safety Clips	

B. Prepare

(1) For removal of computer No.1 (1C 151) trip, safety and tag the following circuit breakers :

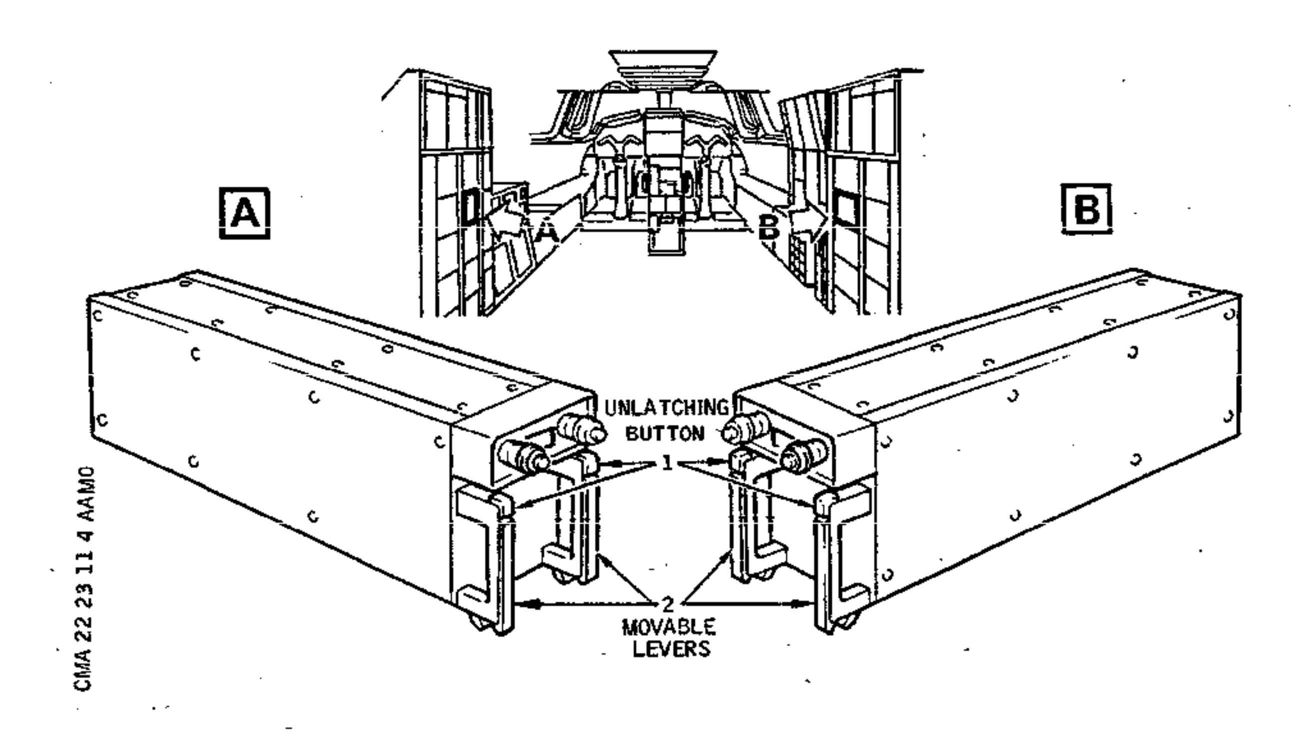
SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
TRIM 1 CONT	1-213	1C 161	Q11
TRIM COMP 1 SUP	13-215	1C 162	C 5
TRIM SYNCHRO SYS 1 SUP		1C 163	E 5

(2) For removal of computer No.2 (2C151) trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
TRIM 2 CONT	5-213	2C 161	B13
TRIM SYNCHRO SYS 2 SUP	13-216	2C 163	A16
TRIM COMP 2 SUP		2C 162	E16

R (3) Remove panel 215BS to gain access to shelf 4-215 for
R removal of computer No.1 (1C151) or panel 216BS for
R removal of computer No.2 (2C151).

C. Remove



Location of Electric Trim Computers
Figure 401

R (1) On front face of computer, press unlatching buttons (1) on top of the two pulling handles.

(a) The two movable levers (2) fall.

(2) Fully lower the two movable levers.

(3) Withdraw computer by pulling the handles.

D. Preparation of Replacement Component

R (1) Check that computer seating is clean and that rack
R connectors are in correct condition (no corrosion).

R (2) Visually check computer for correct external condition
R (no dents) and check that connectors are undamaged and
R free from traces of corrosion.

E. Install

(1) Press the two unlatching buttons.

(a) The two movable levers fall.

(2) Position computer on its rails.

(3) Push computer fully home.

(4) Lift the two movable levers until pawls lock into position.

(5) Remove safety clips and tags and reset the circuit breakers previously tripped.

F. Tests (Ref. 22-23-11, Adjustment/Test)

G. Close-Up

R (1) Install panel 215BS or 216BS.

R (2) Remove access platform.

ELECTRIC TRIM COMPUTER - ADJUSTMENT/TEST

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

1. General

CAUTION : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

Test procedure being identical for each computer, only computer No.1 (Captain's side) test is described while information relating to computer No.2 (First Officer's side) is given in parentheses.

2. Operational Test

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.470 m (14 ft. 8 in.)	
Electrical Ground Power Unit	

B. Prepare

(1) Make certain that the following circuit breakers are set

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
LH UC WEIGHT SW "A" SYS SUP	1-213	G 292	M17
AUDIO WARN SYS SUP 1		W 371	M21
MWS SUP 1		W 252	N21
ADC 28V SUP		1F 74	P12
TRIM 1 CONT		1C 161	Q11
AT CONT		1C 180	Q12
AFCS CONT		1C 19	Q14
ADC 1 26V SUP	2-213	1F 78	A 2
LAT ACCELMTR 1 26V SUP		1C 42	A 4
FLT CONT POSN IND 26V 400 Hz SUP		C 84	B 4
1ST PLT ADC INST SUP		1F 75	B 3
AUTOSTAB 1 COMP SUP		1C 37	E 5
ADC1 115V SUP		1F 73	F 3
RH UC WEIGHT SW "B" SYS SUP	3-213	G 294	B 9
AFCS 2 CONT	5-213	2C 19	A12
AT CONT		2C 180	A14
TRIM 2 CONT		2C 161	B13
AUDIO WARN SYS SUP 2		W 372	C17
MWS SUP 2		W 251	D15
ADC 2 28V SUP		2F 74	F12
TRIM COMP1 SUP	13-215	1C 162	C 5
TRIM SYNCHRO SYS 1 SUP		1C 163	E 5
2ND PLT ADC INST SUP	13-216	2F 75	A14
TRIM SYNCHRO SYS 2 SUP		2C 163	A16
LAT ACCELMTR 2 26V SUP		2C 42	B16
AUTOSTAB 2 COMP SUP		2C 37	D17
TRIM COMP 2		2C 162	E16
ADC2 26V SUP		2F 78	F14
ADC2 115V SUP		2F 73	F15

(2) Set the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-216	X 345	G 4

(3) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing)

(4) At Flight Engineer's station, on EQUIPMENT BAY COOLING panel, make certain that electronics rack ventilation is operating (Ref.21-21-00).

(5) Pressurize Blue hydraulic system (Ref. 29-12-00, Servicing).

(6) Set flight controls in mechanical mode (Ref. 27-00-00, Servicing).

(7) At flight compartment, on centre console

(a) On ADC control panel, make certain that TEST selector switches are in NORM position.

(b) Place ADC 1 (ADC 2) switch in ON position.

(c) If ADC 1 (ADC 2) caption light illuminates, reset by pressing caption light which must extinguish.

(d) Set pitch trim control wheel to 0°.

(e) Place the four throttle control levers in flight idle position.

C. Test

(1) On ceiling panel, the computer having been energized for three minutes, engage switch 1 on ELECTRIC TRIM control unit.

(a) Switch must remain engaged.

(b) Red TRIM warning light must extinguish.

(2) On centre console, pitch trim control wheel must not rotate.

(3) On Captain's control column.

(a) Maintain PITCH TRIM control switch pressed in UP position for a few seconds then release it.

(b) On centre console, pitch trim control wheel rotates in nose-up sense and rattle aural warning sounds.

<u>NOTE</u> : Pitch trim control wheel rotation is displayed on associated indicator and elevon deflection on ICOVOL (flight control surface position indicator).

(c) Maintain PITCH TRIM control switch pressed in DOWN position for a few seconds then release it.

(d) On centre console, pitch trim control wheel rotates in nose-down sense and rattle aural warning sounds. Control columns move forwards.

(4) Perform the same operations on First Officer's control column (paragraph 2.C.(3) through paragraph 2.C.(3)(d). Results must be identical.

(5) On Captain's and First Officer's control columns

(a) Simultaneously press PITCH TRIM control switch on Captain control column in nose-up sense and First Officer PITCH TRIM control switch in nose-down sense.

(6) On ELECTRIC TRIM control unit, switch 1 (2) returns to OFF position.

(a) On master warning panel, red TRIM warning light must illuminate.

(b) Single stroke gong must sound.

(7) On master warning panel, press red TRIM warning light in order to cancel warning.

(8) On centre console, make certain that pitch trim control wheel is de-clutched.

(9) On ELECTRIC TRIM control unit, engage switch 1 (2).

(a) Switch must remain engaged.

(10) Operate Captain's or First Officer's PITCH TRIM control switch in UP sense in order to set pitch trim control wheel to 8° in nose-up sense.

(11) Manually bring throttle control lever No.1 to maximum thrust position.

(a) On ELECTRIC TRIM control unit, switch 1 (2) must return to OFF position.

(b) On master warning panel, red TRIM warning light must illuminate.

(c) Single stroke gong must sound.

(12) On master warning panel, press TRIM warning light in order to cancel warning.

(13) Place throttle control lever No.1 in flight idle position..

(14) Engage switch 1 (2) on ELECTRIC TRIM control unit and repeat the same procedure with the three other throttle control levers, as described from paragraph 2.C.(11) through paragraph 2.C.(13). Results must be identical.

(15) Set pitch trim control wheel to 0°.

(16) On ADC control panel, place ADC 1 (ADC 2) switch in OFF position.

D. Close-Up

(1) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-216	X 345	G 4

(2) De-pressurize Blue hydraulic system (Ref. 29-12-00, Servicing).

(3) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(4) Remove access platform.

R PITCH TRIM ACTUATOR REMOVAL/INSTALLATION

1. General

R The trim actuator C152 is fitted on the integral pitch trim.

2. Trim Actuator

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platforms 4.470 m (14 ft. 8 in.) 3.220 m (10 ft. 7 in.)	
R Warning notices	
Electrical Ground Power Unit	
R Rigging Pins - Set - Integral Trim Pitch/Roll/Yaw	D921277000
Circuit Breaker Safety Clips	
Blanking Caps for Electrical Plugs	
Lockwire - Corrosion Resistant Steel, R Condition A, Dia. 0.813 mm (0.032 in.)	

B. Prepare

R

R (1) Trip, safety and tag the following circuit breakers

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
TRIM 1 CONT	1-213	1C 161	G11
TRIM 2 CONT	5-213	2C 161	B13
R TRIM COMP 1 SUP	13-215	1C 162	C 5
TRIM SYNCHRO SYS 1 SUP		1C 163	E 5
TRIM SYNCHRO SYS 2 SUP	13-216	2C 163	A16
TRIM COMP 2 SUP		2C 162	E16

R

R (2) In the flight compartment, on centre console, place pitch trim in 0° position.

R (3) Open access door 121DB, immobilize integral trim with
R rigging pin.

WARNING : DISPLAY WARNING NOTICES ON ENGINES 1, 2 AND 3 PROHIBITING PRESSURIZATION OF BLUE, GREEN AND YELLOW HYDRAULIC SYSTEMS BY HYDRAULIC GROUND POWER UNIT.

DISPLAY A WARNING NOTICE AT FLIGHT ENGINEER'S STATION PROHIBITING USE OF GROUND PRESSURIZING SYSTEM ELECTRIC PUMPS.

R WARNING : DISPLAY A WARNING NOTICE IN FLIGHT COM-
R PARTMENT PROHIBITING OPERATION OF FLIGHT
R CONTROLS.

C. Remove

(1) Through access door 121DB, locate and disconnect both dual drive rods from the artificial feel input lever and torque tube bellcrank.

(2) Cut and remove lockwire from the 4 mounting screws on trim actuator (1).

(3) Unscrew the 2 lower mounting screws (9)

(4) Disconnect the 2 connectors (2) from sockets A and B on trim actuator (1) ; A for system No.1, B for system No.2.

(5) Install protective caps on electrical sockets A and B.

(6) Unscrew the two upper mountings (8) while holding the trim actuator.

(7) Disengage trim actuator (1) slightly in order to reach and hold grooved bushing (10).

(8) Remove trim actuator (1) ; the grooved bushing remains on the integral trim drive shaft.

NOTE : The grooved bushing is left in its position in order to facilitate the actuator installation ; the latter being previously set to zero (Ref. paragraph D).

D. Preparation of Replacement Component

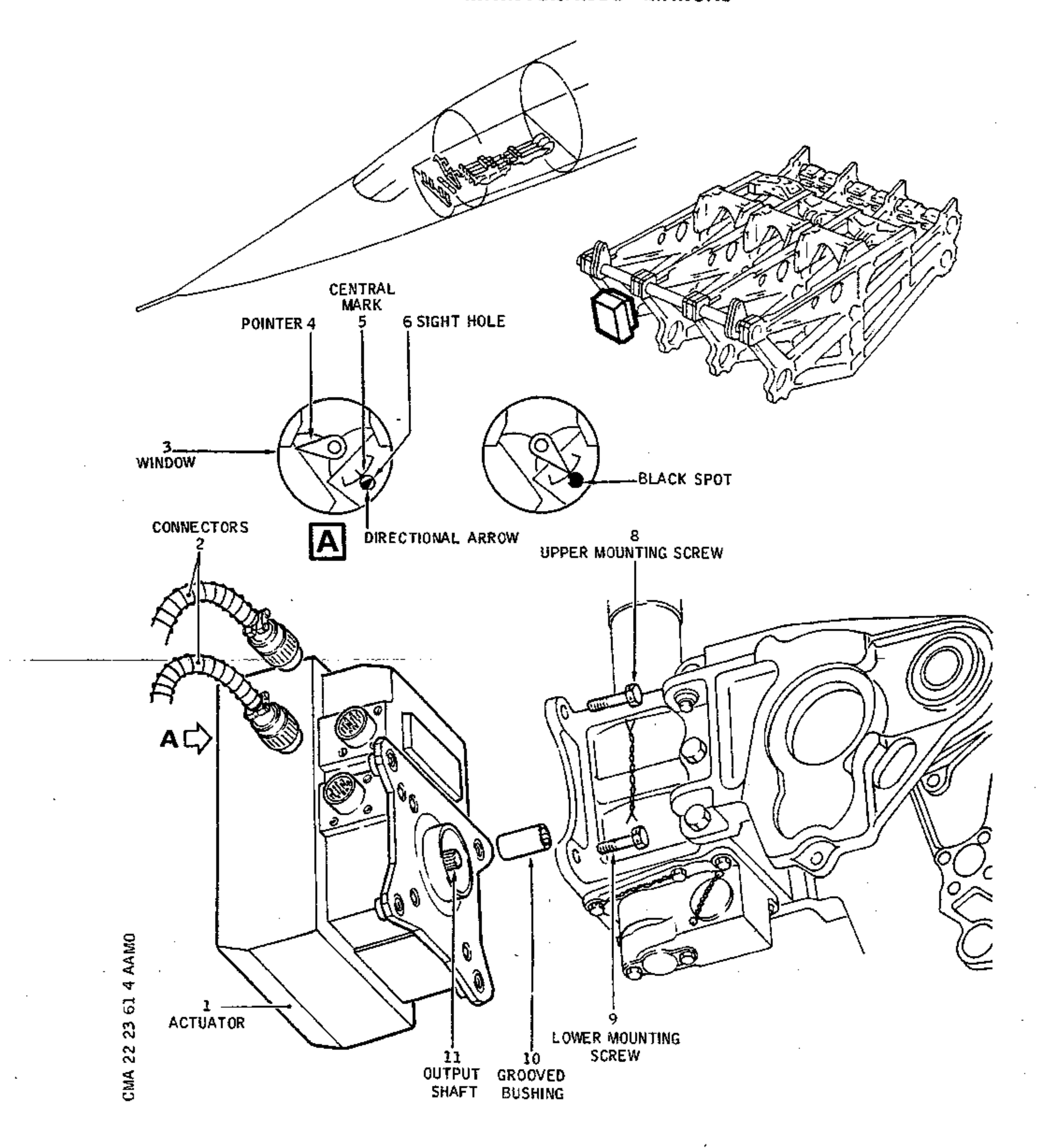
(1) Remove protection sleeve from actuator output shaft.

(2) Check for damage and corrosion evidence on the trim actuator as well as for damage on electrical connectors.

(3) Before trim actuator installation, through access door 121DB, adjust the zero of the output shaft (11) in the following manner :

(a) Through window (3) on trim actuator, observe sight hole (6).

(b) Rotate actuator output shaft (11) until arrows appear through the sight hole then in the direction given by the arrows, a black spot with the same diameter as that of the sight hole is seen through the latter.



R

Trim Actuator
Figure 401

(c) After having performed this preliminary adjustment, the correct setting of the output shaft is obtained when pointer (4) is aligned with the central mark (5) engraved beside sight hole (6), the black spot appearing in the sight hole.

E. Install

R (1) Install actuator (1) so that the output shaft corresponds with grooved bushing (10) without axial displacement.

R (2) Hold actuator (1), insert and screw up without tightening the two upper mounting screws (8).

R (3) Insert and screw up the two lower mounting screws (9).

R (4) Tighten the four mounting screws.

R (5) Wirelock the four mounting screws.

R (6) Remove protective caps from electrical sockets A and B.

R (7) Connect the two connectors (2) to sockets A and B on trim actuator (1).

R (8) Connect the two dual drive rods to the artificial feel
R input lever and torque tube bellcrank.
R Torque to between 27 and 32 lbf.in. (0.32 to 0.38 m.daN). Install pin.

R (9) Remove warning notices.
R
R (10) Remove rigging pin from the integral pitch trim.

R (11) Remove safety clips and tags and reset the circuit breakers previously tripped.

F. Test

R (Ref. Adjustment/Test).

G. Close Up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
R
R (2) Close access door 121DB.

R (3) Remove access platforms.

TRIM ACTUATOR - ADJUSTMENT/TEST

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

1. General

WARNING : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

The trim actuator operates with two identical lanes. This unit is the moving part of the servo-positioning system. It produces the trim deflection angle calculated by the computers of lane 1 and lane 2.

2. Operational Test

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.470 m (14 ft.8 in.)	
Electrical Ground Power Unit	

B. Prepare

(1) Make certain that the following circuit breakers are

set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ADC1 28V SUP	1-213	1F 74	P12
TRIM 1 CONT		1C 161	Q11
AT CONT		1C 180	Q12
AFCS1 CONT		1C 19	Q14
ADC1 26V SUP	2-213	1F 78	A 2
1ST PLT ADC INST SUP		1F 75	B 3
ADC1 115V SUP		1F 73	F 3
AFCS2 CONT	5-213	2C 19	A12
AT CONT		2C 180	A14
TRIM2 CONT		2C 161	B13
ADC2 28V SUP		2F 74	F12
TRIM COMP1 SUP	13-215	1C 162	C 5
TRIM SYNCHRO SYS1 SUP		1C 163	E 5
2ND PLT ADC INST SUP	13-216	2F 75	A14
TRIM SYNCHRO SYS2 SUP		2C 163	A16
TRIM COMP2 SUP		2C 162	E16
ADC2 26V SUP		2F 78	F14
ADC2 115V SUP		2F 73	F15

(2) Reset the following circuit breaker :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-216	X 345	G 4

(3) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing)

(4) At Flight Engineer's station, on EQUIPMENT BAY COOLING panel, make certain that electronics rack ventilation is operating (Ref. 21-21-00).

(5) Pressurize Blue hydraulic system (Ref. 29-12-00, Servicing).

(6) Set flight controls in mechanical mode (Ref. 27-00-00, Servicing).

(7) In flight compartment, on centre console :

(a) On ADC control panel, make certain that TEST selector switches are in NORM position.

(b) Place ADC1 and ADC2 switches in ON position.

(c) If ADC1 and ADC2 caption lights illuminate, reset by pressing caption lights, which must extinguish.

(d) Place pitch trim control wheel in 0° position.

(e) Place the four throttle control levers at low mechanical stop.

C. Test

R (1) Check of pilot trim operation.

R (a) After computers have been energized for three
R minutes : on ceiling panel, engage switch 1 on ELECTRIC TRIM control unit.

R (a1) Switch must remain engaged.

R (a2) On centre console, pitch trim control wheel must not rotate.

(b) On Captain's or First Officer's control column
R handwheel, press PITCH TRIM control switch in UP
R sense for a few seconds.

R (b1) Pitch trim control wheel rotates in nose-up
R sense and cricket aural warning sounds.

(c) Disengage ELECTRIC TRIM control unit switch 1, and engage switch 2.

R (c1) Switch must remain engaged.

(d) On Captain's or First Officer's control column
R handwheel, press PITCH TRIM control switch in DOWN
R sense for a few seconds.

R (d1) Pitch trim control wheel rotates in nose down
R sense and cricket aural warning sounds.

(e) On ELECTRIC TRIM control unit, disengage switch 2.

R (f) On centre console, place pitch trim control wheel in 0° position.

(2) Check of override and of de-clutched position.

(a) Engage ELECTRIC TRIM control unit switches 1 and 2

R (a1) Switches must remain engaged.

(b) On Captain's control column handwheel, press then hold PITCH TRIM switch in UP position.

R (c) Manually stop pitch trim control wheel while rotating.

(c1) ELECTRIC TRIM control unit switches 1 and 2 must return to OFF position.

(d) On Captain's control column handwheel, release PITCH TRIM control switch.

(e) Check that pitch trim control wheel is de-clut-ched, then place it in 0° position.

(f) Place ADC 1 and ADC 2 switches in OFF position.

RB D. CHECK OF SAFETY FEATURE AT TAKE-OFF.

RB (1) On centre console,

RB a) Make certain that the pitch trim control wheel is
RB indicating midway of the green band region (trim
RB deflection range which should be -1° to +3.5°).

RB b) Make sure that the four throttle control levers are
RB in minimum stop position.

RB c) On ADC control panel, make certain that ADC1 and ADC2
RB switches are in ON position and that associated TEST
RB selector switches are in NORM position.

RB (2) On overhead panel, engage switch 1 and 2 of ELECTRIC
RB TRIM control unit.

RB (3) Manually bring throttle control lever No. 1 to maximum
RB mechanical stop.

RB (4) On centre console, hold either Captains or First Offi-
RB cers PITCH TRIM switch in UP position until the pitch
RB trim handwheel indicates out of the green band region.
RB At the point where the green band leaves the indicator:-

RB a) Switch 1 and 2 of ELECTRIC TRIM control unit must
RB disengage.

RB b) On Master Warning Panel, red TRIM warning must
RB illuminate.

RB c) Single stroke gong sounds.

RB (5) On Master Warning Panel, press TRIM indicator light to
RB cancel warning.

RB (6) On centre console, hold either Captains or First Offi-
RB cers PITCH TRIM switch in DOWN position until the pitch
RB trim control wheel is indicating midway of the green
RB band region.

RB (7) Engage switch 1 and 2 of ELECTRIC TRIM control unit and
RB repeat test D.(4) operating the PITCH TRIM switch in
RB DOWN position until the pitch trim handwheel indicates
RB out of the green band region. The results in D.(4).a),
RB b) and c) MUST be identical.

RB (8) Repeat the above two tests with each of the three
RB remaining throttle levers. The results must be identical.

R E. Close-up.

(1) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-216	X 345	G 4

(2) Depressurize Blue hydraulic system (Ref. 29.12.00, Servicing).

(3) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24.41.00, Servicing).

(4) Remove access platform.

PITCH TRIM SWITCH - REMOVAL/INSTALLATION

1. General

WARNING : OBSERVE THE ELECTRICAL SAFETY PRECAUTIONS DESCRIBED IN 24-00-00, SERVICING.

The electric trim control is provided by means of eight switches fitted in the Captain control column handwheel LH arm or in the First Officer control column handwheel RH arm.
Four switches are associated with the PITCH TRIM switch located at Captain control column handwheel :
1C157, 2C157 for UP position, and 1C159, 2C159 for Down position. Four switches are associated with the PITCH TRIM switch located at First Officer control column handwheel, 1C158, 2C158 for UP position, and 1C160, 2C160 for Down position.

The removal and installation procedure being identical for each switch, it will be described for one switch only.

2. PITCH TRIM Switch
(Ref. Fig. 401)

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.440 m (14 ft. 8 in.)	
Circuit Breaker Safety Clips	
Special Product (Ref. 20-30-00, No.111)	
Special Product (Ref. 20-30-00, No.120)	

B. Prepare

(1) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
TRIM COMP 1 SUP	13-215	1C 162	C 5
TRIM COMP 2 SUP	13-216	2C 162	E16

C. Remove

(1) Unscrew then remove the three attaching screws (1) from cover (2).

(2) Remove cover (2).

(3) Remove hinge pin (8) in order to separate PITCH TRIM switch (9) from support plate (4).

(4) Unscrew then remove the five attaching screws (3) from support plate (4).

(5) Depending on the length of wiring which can be pulled out, separate support plate (4) from control handwheel.

(6) Hold support plate (4) to unscrew slotted round nut (7) of associated switch (6).

(7) Remove switch (6) from its recess.

(8) Slide protection sleeve (5) to reach the three lugs of switch (6).

(9) Identify the three wires (- 15VDC supply and UP and DOWN controls) ; separate them from switch lugs by means of a soldering iron.

(10) Remove switch (6).

D. Preparation of Replacement Component

(1) Check switch for correct condition.

(2) Make certain that lugs are in good condition.

(3) Make certain that push-button moves freely and smoothly

E. Install

(1) Note identification of the three wires, then connect them to the three associated switch (6) lugs by means of a soldering iron.

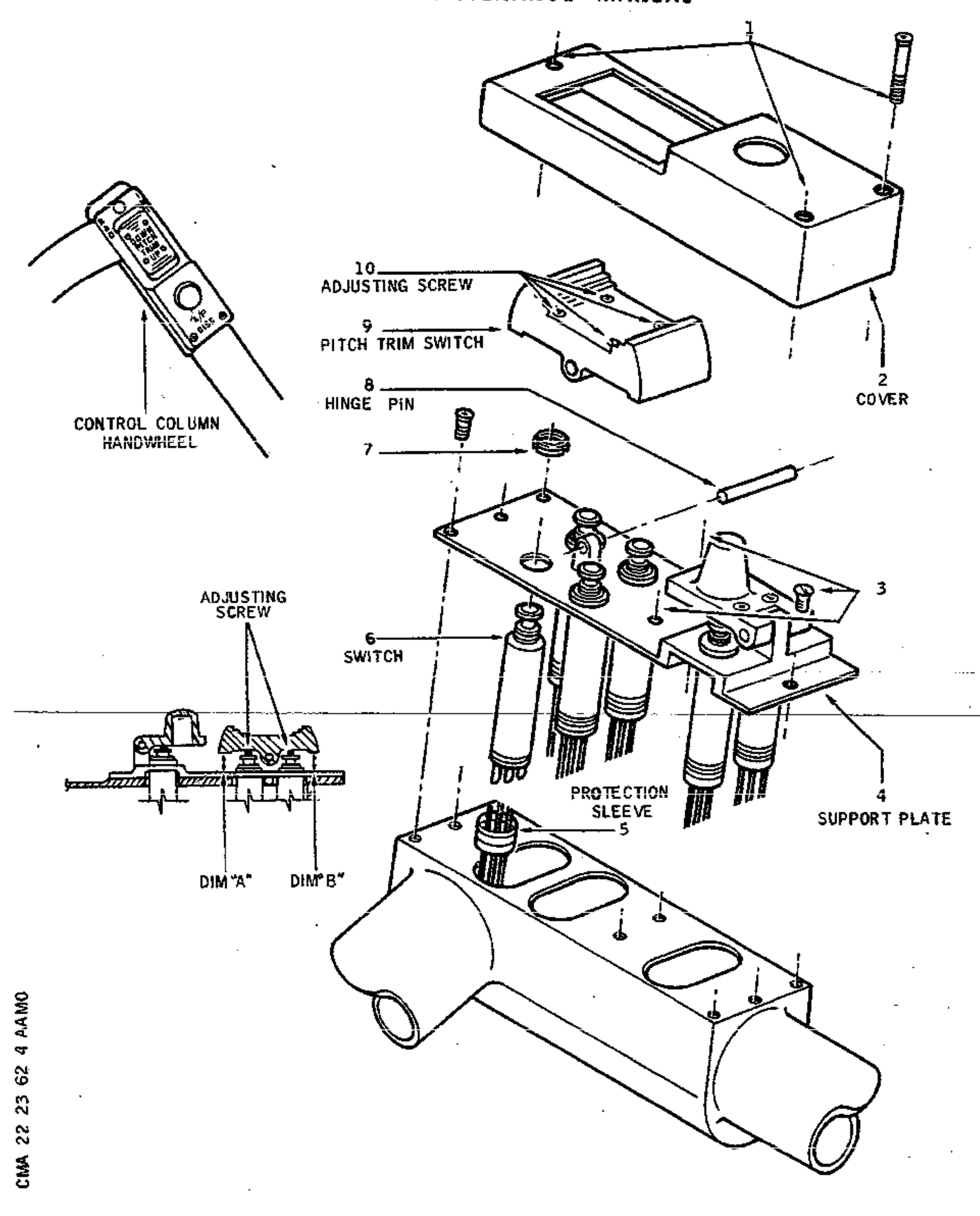
(2) Position protection sleeve.

(3) Introduce switch (6) in its recess.

(4) Install and tighten slotted round nut (7).

(5) Install PITCH TRIM switch (9), install hinge pin (8)

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PITCH TRIM Switch Installation
Figure 401

in its recess so that PITCH TRIM switch becomes integral with support plate.

(6) Check that the ends of the four adjusting screws (10), which protrude from PITCH TRIM switch (9) inner face come into contact with switch push-buttons without causing their displacement ; otherwise, set adjusting screw (5), (10) as follows :

(a) Remove relevant adjusting screw(s) (10).

(b) Coat threads with No.111 and No.120 products.

(c) Install side UP or DOWN adjusting screw(s) of PITCH TRIM switch (9).

(d) Tighten until interval between both ends of PITCH TRIM switch (9) and support plate (4) is identical (dimension A equal to dimension B).

(7) Carefully slide switch wiring into control column handwheel until support plate (4) almost comes into contact with control column handwheel.

(8) Install support plate (4) on control column handwheel and tighten with the five relevant attaching screws (3).

(9) Install cover (2) and tighten three relevant attaching screws.

(10) Remove safety clips and tags and reset the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
TRIM COMP 1 SUP	13-215	1C 162	C 5
TRIM COMP 2 SUP	13-216	2C 162	E16

F. Test

(1) Carry out trim rotation test (Ref. 22-23-00, Servicing, Operational Test). Trim 1, then trim 2.

G. Close-Up

(1) Remove access platform.

PITCH FEEL SENSOR - REMOVAL/INSTALLATION

1. General

WARNING : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN
R (22-00-00, SERVICING).

R Pitch feel sensor C154 is fitted on the artificial feel chassis. Its input lever is driven by a mechanical rod which transmits the artificial feel motion.

2. Pitch Feel Sensor

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.470 m (14 ft. 8 in.)	
Warning Notices	
Electrical Connector Protective Caps	
Circuit Breaker Safety Clips	
Lockwire Corrosion-Resistant Steel, Condition A, Dia. 0.813 mm (0.032 in.)	

B. Prepare

(1) Trip, safety and tag the following circuit-breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
TRIM SYNCHRO SYS 1 SUP	13-215	1C 163	E 5
TRIM SYNCHRO SYS 2 SUP	13-216	2C 163	A16

WARNING : DISPLAY WARNING NOTICES ON ENGINES 1, 2 AND 3 PROHIBITING PRESSURIZATION OF BLUE, GREEN AND YELLOW HYDRAULIC SYSTEMS BY HYDRAULIC GROUND POWER UNIT.

DISPLAY A WARNING NOTICE AT FLIGHT ENGINEER'S STATION PROHIBITING USE OF GROUND

PRESSURIZING SYSTEM ELECTRIC PUMPS.

WARNING : DISPLAY A WARNING NOTICE AT FLIGHT ENGINEER'S STATION PROHIBITING OPERATION OF ANY OF THE FLIGHT CONTROLS.

(2) In flight compartment

(a) Remove floor panel 211HF providing access to the pitch sensor.

C. Remove

(1) Through access door 211HF, remove the upper protective housing from the pitch integral trim by unscrewing the four mounting screws.

(2) Disconnect the two connectors (2) from sockets A and B on sensor (3), A for system No.1, B for system No.2.

R (3) Cut and remove lockwire from bolt (6).

(4) Disconnect drive rod (5) from input lever (4) of the pitch feel sensor (3) by loosening bolt (6).

(5) Cap sockets (2), A and B

(6) Cut and remove lockwire from the mounting screws (1).

(7) Unscrew and remove the three mounting screws (1) from the mounting flange while holding pitch feel sensor (3).

(8) Remove pitch feel sensor (3).

D. Preparation of Replacement Component

(1) Remove holding tool from pitch feel sensor input lever ; install it on the removed pitch feel sensor.

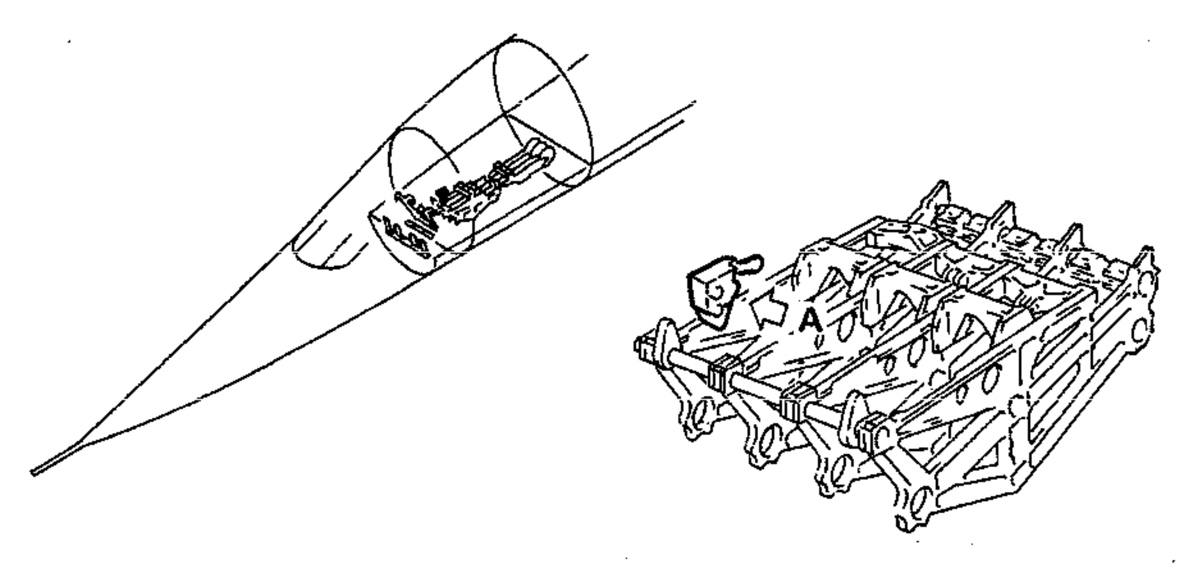
(2) Visually check the sensor and input lever as well as the connectors for damage or corrosion evidence.

E. Install

(1) Position pitch feel sensor (3).

(2) Insert and screw up the three mounting screws (1) ; do not fully tighten.

(3) Offer up drive rod (5) on input lever (4) of the



A

PITCH FEEL SENSOR
3

CONNECTORS
2

INPUT LEVER
4

DRIVE ROD
5

1

6

CMA 22 23 81 4 AAMO

R

Pitch Feel Sensor Installation
Figure 401

pitch feel sensor.

(4) Insert bolt (6) linking the drive-rod yoke (5) with input lever (4) of the sensor (3).

(5) Do not fully tighten bolt (6).

(6) Torque the 3 mounting screws (1) on pitch feel sensor (3) to between 66 to 77 lbf.in. (0.74 to 0.87 m.daN).

(7) Lockwire the three mounting screws (1).

(8) Torque bolt (6) to between 30 to 35 lbf.in. (0.34 to 0.40 m.daN).

(9) Lockwire bolt (6).

(10) Remove the two protective caps from sockets A and B.

(11) Connect both connectors (2) to sockets A and B on pitch feel sensor (3) ; A for system No.1, B on system No.2.

(12) Place the protective plate of the pitch integral trim, screw up and lockwire the four mounting screws.

(13) Remove safety clips and tags and reset the circuit breakers previously tripped.

(14) Remove warning notices.

F. Tests

R (Ref. Adjustment/Test).

G. Close Up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2) Install and secure floor panel 211HF.

(3) Remove access platform.

PITCH FEEL SENSOR - ADJUSTMENT/TEST

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

1. General

WARNING : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

The purpose of the following adjustment/tests is to check the pitch feel sensor for correct operation. This sensor converts the artificial feel lever mechanical motion into an AC output signal.

2. Operational Test

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.470 m (14 ft. 8 in.)	
Electrical Ground Power Unit	
Circuit Breaker Safety Clips	

B. Prepare

(1) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
COMPASS COUPLER SYS 1 SW SUP 1	1-213	1F 134	F14
LH UC WEIGHT SW"A" SYS SUP		G 292	M17
AUDIOWARN SYS SUP 1		W 371	M21
MWS SUP 1		W 252	N21
ADC 28V SUP		1F 74	P12
WARN & LDG DISPLAY SUP 1		1C 192	P13
WARN & LDG DISPLAY SUP 2		1C 193	P14
TRIM 1 CONT		1C 161	Q11
AT CONT		1C 180	Q12
AP/FD SYS 1 CONT		1C 17	Q13
AFCS 1 CONT		1C 19	Q14
FLT CONT POSN IND CONT		C 83	R11
SAFETY FLT CONT No.1 SUP		1C 651	S20
ADC 1 26V SUP	2-213	1F 78	A 2
LAT ACCLMTR 1 26V SUP		1C 42	A 4
FLT CONT POSN IND 26V 400Hz SUP		C 84	B 4
1ST PLT ADC INST SUP		1F 75	B 3
AP/FD SYS 1 SUP		1C 20	C 5
AUTOSTAB 1 COMP SUP		1C 37	E 5
ADC 1 115V SUP		1F 73	F 3
LDG DISPLAY SYS 1 SUP		1C 191	F 4
COMPASS COUPLER 1 SUP		1F 130	F 8
R.H UC WEIGHT SW B SYS SUP	3-213	G 294	B 9
AP/FD SYS 2 CONT	5-213	2C 17	A11
AFCS 2 CONT		2C 19	A12
AT CONT		2C 180	A14
TRIM 2 CONT		2C 161	B13
AUDIO WARN SYS 2 SUP		W 372	C17
MWS SUP 2		W 251	D15
SAFETY FLT CONT No.2 SUP		2C 651	D17
ADC 2 28V SUP		2F 74	F12
AP/FD COMP1 SUP	13-215	1C 18	A 5
AFCS MODE SYS 1 LTS SUP		1C 273	B 5
COMPASS COUPLER 2 STBY SUP		2F 131	B 7
TRIM COMP 1 SUP		1C 162	C 5
TRIM SYNCHRO SYS 1 SUP		1C 163	E 5
SAFETY FLT CONT COMP No.1		1C 652	E 6

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
115V SUP			
SAFETY FLT CONT COMP No.1 26V SUP		1C 653	F 6
2nd PLT ADC INST SUP	13-216	2F 75	A14
TRIM SYNCHRO SYS 2 SUP		2C 163	A16
AP/FD SYS 2 SUP		2C 20	A17
LAT ACCLMTR 2 26V SUP		2C 42	B16
SAFETY FLT CONT COMP No.2 26V SUP		2C 653	C16
SAFETY FLT CONT COMP No.2 115V SUP		2C 652	C17
COMPASS COUPLER 2 NORM SUP		2C 130	D15
AUTOSTAB 2 COMP SUP		2C 37	D17
TRIM COMP 2 SUP		2C 162	E16
AFCS MODE SYS 2 SUP		2C 273	E17
ADC 2 26V SUP		2F 78	F14
ADC 2 115V SUP		2F 73	F15
AP/FD COMP 2 SUP		2C 18	F18
COMPASS COUPLER SYS 2 SW SUP	15-216	2F 134	A21

(2) Reset the following circuit breaker :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-216	X 345	G 4

(3) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing)

(4) At Flight Engineer's station

(a) On EQUIPMENT BAY COOLING panel, make certain that electronics rack ventilation is operating (Ref. 21-21-00).

(b) Place INS No.1 and INS No.2 MSU selectors in ALIGN position in order to energize INS No.1 and INS

No.2 (Ref. 34-45-00, Adjustment/Test - Operational Test).

NOTE : The two AP/FDs cannot be engaged until G flag has disappeared from both ADIs.

(c) On COMPASS unit, place both DG MAG switches in MAG position.

(5) Pressurize Blue hydraulic system (Ref. 29-12-00, Servicing) and Green hydraulic system (Ref. 29-11-00, Servicing).

(6) Set flight controls in Blue electrical mode (Ref. 27-00-00, Servicing).

(7) In flight compartment.

(a) On Captain's instrument panel, place ATT/INS1/INS3 switch in INS1 position.

(b) On First Officer's instrument panel, place ATT/INS2/INS3 switch in INS2 position.

(c) On centre instrument panel 6-211, make certain that AFCS MODE rotary switch is in BRIGHT position

(d) On both sides of AFCS control unit, place RAD/INS switches in INS position.

(e) On centre console

(e1) On ADC control panel check that TEST selector switches are in NORM position.

(e2) Place ADC 1 and ADC 2 switches in ON position

(e3) If ADC 1 and ADC 2 caption lights illuminate,press to reset.

(e4) Set pitch trim control wheel to 0°.

(e5) Place the four throttle control levers at low mechanical stop.

(e6) On AFCS datum adjust unit, make certain that the TURN knob is in centre (neutral) position, and that NOSE UP-NOSE DOWN switch is in neutral position.

(f) On ceiling panel.

(f1) On flight control unit, place ANTI STALL SYSTEM 1 and ANTI STALL SYSTEM 2 switches in ON position.

(f2) On AUTOSTAB No.1 and AUTOSTAB No.2 control units, engage PITCH, ROLL and YAW switches.

- The six switches must remain engaged.
- On flight control unit, SYST 1 FAIL and SYST 2 FAIL caption lights must extinguish.

C. Test

(1) The computers having been energized for three minutes, engage switches 1 and 2 on ELECTRIC TRIM control unit located on ceiling panel.

(a) Both switches remain engaged.

(b) On master warning panel, red TRIM warning light must extinguish.

(2) On AFCS control unit, engage AP1 engage switch.

(a) Switch must remain engaged.

R (b) The associated green AP1 indicator light must illuminate.

(c) HDG HOLD and PITCH HOLD push-buttons must illuminate.

NOTE : A control column displacement may occur ; in order to suppress it, it is necessary to operate NOSE UP-NOSE DOWN switch on AFCS datum adjust unit on centre console.

(d) Allow time for AP and trim systems to stabilize.

(3) On centre console

(a) On AFCS datum adjust unit operate NOSE UP-NOSE DOWN switch, in NOSE UP sense.

(b) Check that pitch trim control wheel rotates in nose-up direction when control column moves rearwards.

(c) Elevons deflect upwards (check on ICOVOL (flight control surface position indicator)).

(d) On AFCS datum adjust unit operate NOSE UP-NOSE DOWN switch in NOSE DOWN sense.

(e) Check that pitch trim control wheel rotates in nose-down sense while control column moves forwards.

(f) Elevons deflect downwards (Check on ICOVOL).

(g) While holding NOSE UP-NOSE DOWN switch in the same position, disengage AP1 (AP2) engage switch.

(g1) Captain's and First Officer's control columns must remain in same position as that obtained when autopilot was disengaged ; no jerk must occur.

(h) Release NOSE UP-NOSE DOWN switch.

(4) Cancel visual and aural warnings by pressing AP warning light on either warning and landing display indicator

(5) On ELECTRIC TRIM control unit, disengage switch 1.

(6) On AFCS control unit, engage AP2 switch.

(a) Switch must remain engaged.

R (b) Associated green AP2 indicator light must illuminate.

(c) HDG HOLD and PITCH HOLD push-buttons must illuminate.

(7) On centre console, carry out the same test as that described from para. 2. C. (3) (a) through para. 2. C. (4) with electric trim lane 2, referring to information in parentheses. Results must be identical.

(8) On ELECTRIC TRIM control unit, disengage switch 2.

(9) On AUTOSTAB No.1 and AUTOSTAB No.2 control units, disengage PITCH, ROLL, and YAW switches.

(a) On master warning panel, cancel the red STAB and TRIM warning lights by pressing warning lights.

(10) On flight control unit.

(a) Place flight controls in mechanical mode (Ref. 27-00-00, Servicing).

(b) Place BLUE INVERTER and GREEN INVERTER switches in PWR OFF position.

(c) Place ANTI STALL SYSTEM 1 and ANTI STALL SYSTEM 2 switches in OFF position.

(11) On centre console

(a) On ADC control panel, place ADC1 and ADC2 switches in OFF position.

R (b) Place pitch trim control wheel in 0° position.

(12) Place INS No.1 and INS No.2 MSU switches in OFF position in order to de-energize INS No.1 and INS No.2.

D. Close-Up

(1) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-216	X 345	G 4

R (2) Depressurize Blue hydraulic system (Ref. 29-12-00, Servicing) and Green hydraulic system (Ref. 29-11-00, Servicing).

R
R (3) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(4) Remove access platform.

END OF THIS SECTION

NEXT

AUTOTHROTTLE - DESCRIPTION AND OPERATION

1. General

The autothrottle (AT) system consists of the whole system of components which enable automatic engine thrust control to be achieved in order to acquire or maintain a desired speed. This system is independent of the autopilot.

A. The automatic throttle control is designed to ensure the following functions :

(1) Speed holding with adjustment ability in IAS HOLD mode

(2) Mach number holding with adjustment ability in MACH HOLD mode.

(3) Pre-selected speed acquisition and pre-selected speed change in IAS ACQ mode.

(4) Throttle reduction in flare phase.

(5) Speed holding during altitude capture with autopilot engaged.

(6) Counteracting any significant aircraft overspeed with the AP/FD in MAX CRUISE mode.

B. The system is of the duplicated and monitored type ; it consists of two self-monitored and electrically independent lanes ; each lane drives the four throttle control levers in parallel.

Both lanes are normally engaged simultaneously. Lane 1 has priority and lane 2 is in standby. In case of failure detected in lane 1, the associated engage switch returns to OFF position and lane 2 takes over.

C. The autothrottle operates on all four engines ; but it can also operate with one engine defective.

D. The pilot can adjust throttle control lever position without disengaging the autothrottle. In addition, he may override the system by simultaneously actuating the four throttle levers.

E. By means of an airborne Integrated Test and Maintenance System (ITEM), the autothrottle can be checked on the ground and monitored in flight.
On the ground, the ITEM tests the analog monitoring and com-

putation circuits by means of the self-test circuits.
In flight, the ITEM continually monitors the signals issued by the system safety devices.

F. Information is displayed on the warning and landing display (W & LD) indicators, also used for the autopilot.

2. Description
(Ref. Fig.001 and 002)

A. The autothrottle system consists of :

(1) Two computers (1C171) and (2C171) installed on shelves 4-215 (LH side) and 4-216 (RH side) respectively of the electronics racks.

(2) One AFCS control unit (C1), also used for the autopilot, installed in the glareshield instrument panel.

(3) One AFCS datum adjust unit (C2), also used for the autopilot, installed in the centre console.

(4) Two longitudinal accelerometers (1C183) and (2C183) installed under the floor between frames 11 and 12.

(5) One autothrottle actuator (C172) installed in the centre console.

(6) Four isolation switches (C175), (C176), (C177), (C178) located on the ceiling panel.

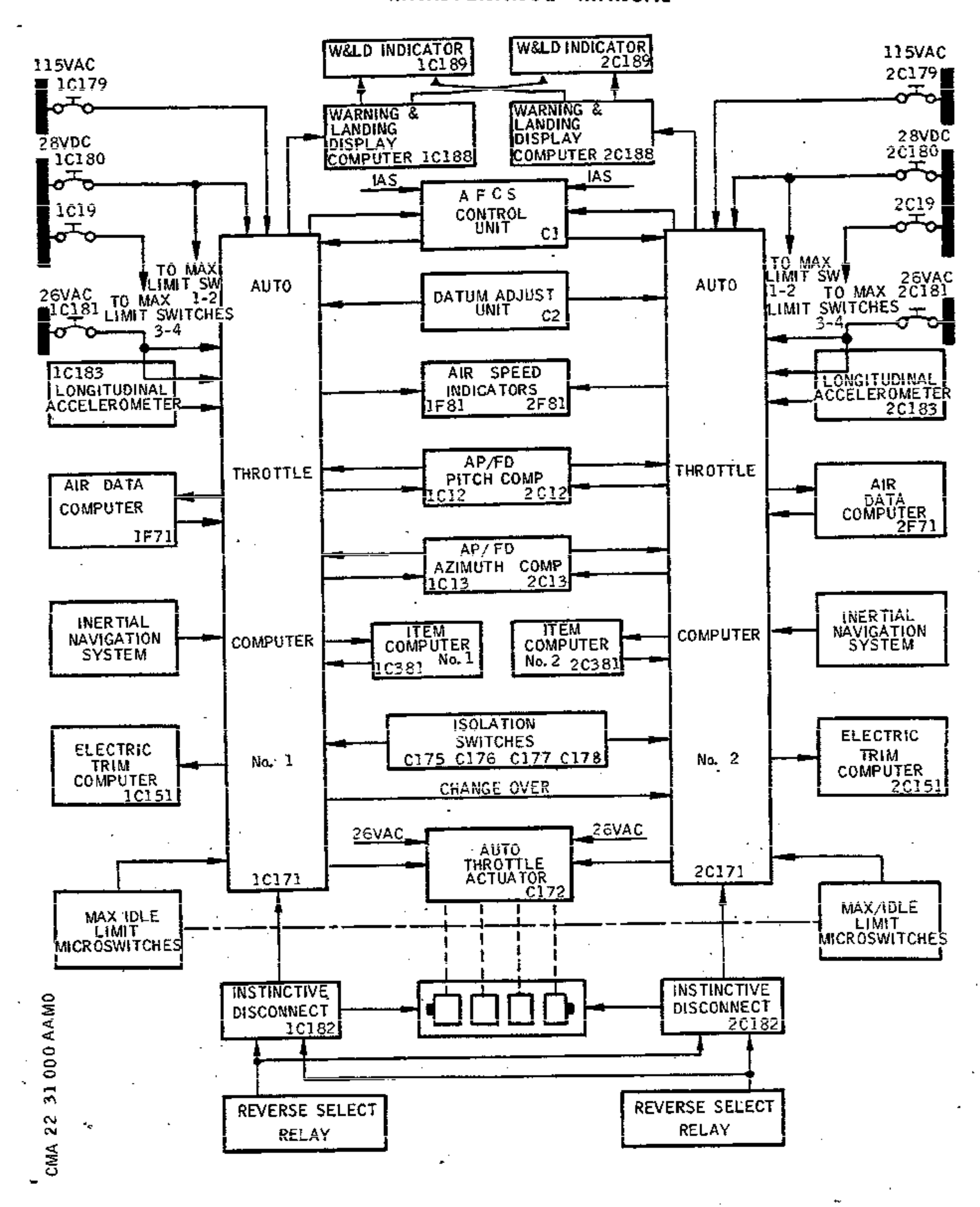
(7) Two instinctive disconnect push-buttons (1C182) and (2C182) (One on each outer throttle control lever).

(8) Four limit microswitches (MAX THRUST, FLIGHT IDLE) per throttle control lever fitted inside the direct thrust switch housing. (Ref. 76-11-19).

B. Each autothrottle computer is linked to the following peripheral systems :

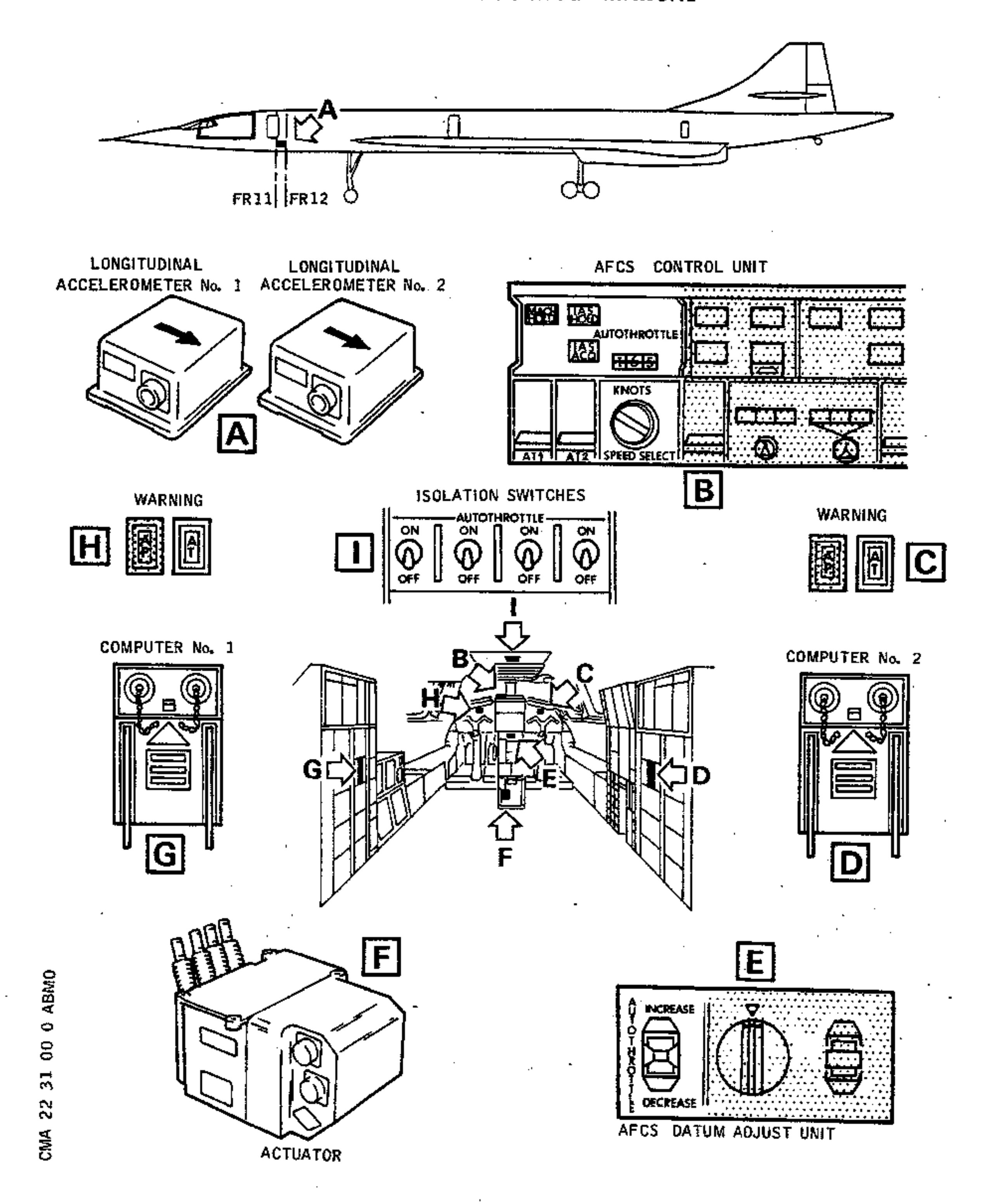
(1) Air data computer (ADC) (Ref. 34-11-00, Description and Operation).
The aircraft is equipped with two ADCs. ADC1 is linked to autothrottle computer No.1 and ADC 2 is linked to autothrottle computer No.2.
Each ADC sends the following signals to the corresponding AT :

(a) Indicated airspeed holding (IAS HOLD ERROR), through two clutchable synchro-transmitters, used



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Autothrottle System Configuration
Figure 001



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Autothrottle System Components
Figure 002

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for IAS HOLD mode. One of these synchro-transmitters is used by the control channel and the other by the monitoring channel.

(b) Mach holding (MACH HOLD ERROR), through two clutchable synchro-transmitters, used for MACH HOLD mode.

(c) Indicated airspeed (IAS), through two synchro-transmitters. The IAS signal is modified by the AFCS control unit to give the IAS ACQ ERROR signal used for IAS ACQ mode.

(d) ADC validity signal (ADC FAIL WARNING). This signal is used by the autothrottle engage logic circuits.

NOTE : All these clutchable synchro-transmitters are used for IAS HOLD and MACH HOLD holding modes.
On selection of one of these modes the AT clutches the corresponding synchro-transmitter at its output electrical zero. Thus the synchro generates an error signal for any variations of the parameter, which is sent to the AT to hold the value existing on selection.

(2) Inertial navigation system (INS) (Ref. 34-45-00, Description and Operation).
The aircraft is equipped with three inertial navigation systems.
INS No.1 is linked to autothrottle computer No.1, and INS No.2 is linked to autothrottle computer No.2.
INS No.3 is used as a standby data source for the instruments and as a check in the inertial signals comparator unit (ISCU).
Each INS sends a PITCH ATTITUDE signal to its associated AT. It also sends a ROLL ATTITUDE signal to the associated AP/FD pitch computer. This signal is used for turn compensation by the autothrottle.

(3) AP/FD pitch computer (Ref. 22-12-00, Description and Operation).
The aircraft is equipped with two AP/FD pitch computers
Each computer sends the following signals to the associated autothrottle computer :

(a) TURN COMPENSATION signal.

(b) IAS-VRC + 5.4 knots analog signal (VRC = reference

cruising speed). This signal is used to counteract any significant aircraft overspeed. The AT is automatically clutched in MACH HOLD mode, with the AP/FD in MAX CRUISE mode.
In this configuration the Mach synchros are not clutched.

(c) ALTITUDE ACQUIRE PRIME logic signal, on selection of ALT ACQ or MAX CLIMB mode, to arm the autothrottle.

(d) CRUISE logic signal, on automatic MAX CRUISE mode engagement.
The AT uses this signal for initiation of the mode : analog switching, inhibition of Mach holding synchros, overspeed in MACH HOLD mode.

(e) AP/FD IN SPEED MODE logic signal, for automatic AT clutching and declutching.

(f) START PROGRAMMED THROTTLE CLOSURE logic signal, during automatic landing, to initiate an automatic throttle reduction.

The autothrottle sends a MAX THROTTLE STOP SWITCH logic signal to the associated AP/FD pitch computer to command addition of the inertial speed factor in the AP.

(4) Electric trim computer (Ref. 22-23-00, Description and Operation).
The aircraft is equipped with two electric trim computers. Each trim computer receives information from the maximum thrust limit microswitches for out-of-trim monitoring on take-off.

(5) Warning and landing display (W & LD) computers (Ref. 22-41-00, Description and Operation).
Each W & LD computer causes disconnection of the associated AT for the following cases :
- Self-detected INS fault, at any altitude.
- INS fault detected by ISCU cruise comparison at an altitude of less than 600 ft.

3. Computer-Autothrottle

A. Description

Each computer is contained in a case.

On the front face are mounted two sockets ZA and ZB used for test and maintenance, one elapsed time indicator and two grip handles.

On the rear face are mounted two rack connectors divided into three groups, the upper connector consists of one single group, the lower connector comprises two groups. These connectors are used for connections with the aircraft electrical network.

B. Computer Components

Each computer comprises

- One power supply unit
- One power amplifier unit
- Four analog circuit board sub-assemblies
- Two logic circuit board sub-assemblies

(1) Power supply unit (Ref. Fig. 003)

From the 115VAC 400 Hz power supply monitored by a level switch between phase and neutral the power supply unit generates the following voltages.

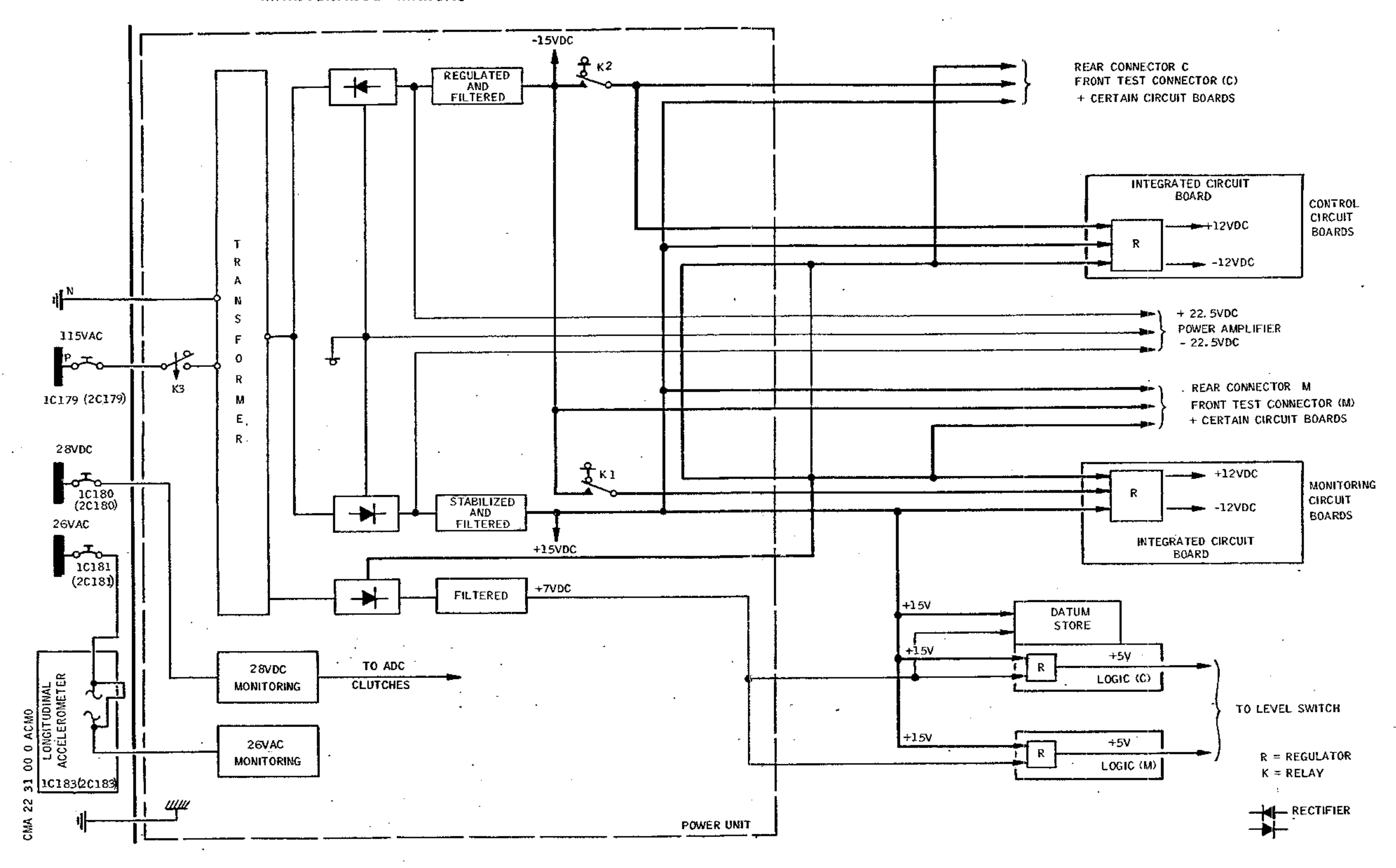
(a) + 15VDC and - 15VDC, control and monitoring. These voltages are filtered and regulated. They supply the logic operational amplifiers and the autothrottle control units i.e., the AFCS control unit, AFCS datum adjust unit and AT instinctive disconnect push-buttons.

The + 12VDC and - 12VDC voltages used to supply the analog operational amplifiers are generated from these two voltages.

(b) + 7VDC, control and monitoring ; this voltage is used to supply the digital logic, self-test and memory adjustment circuits. This is used to generate + 4.5VDC to supply the digital counter circuit flip-flops.

The 28VDC, which is also monitored, is used to supply the ADC synchro clutches and the AFCS control unit push-button lights.

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Power Supply Distribution Diagram
Figure 003

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(2) Power amplifier unit

This is a high gain amplifier which issues a control voltage to the autothrottle actuator. This control voltage varies in accordance with the difference between the FTCM (Full Time Command Modifier) output signal (lever rate error) and the feedback signal (actual lever rate).

(3) Analog circuit-boards

These analog circuit-boards are stacked on support connectors and form control channels on the LH side and monitoring channels on the RH side.

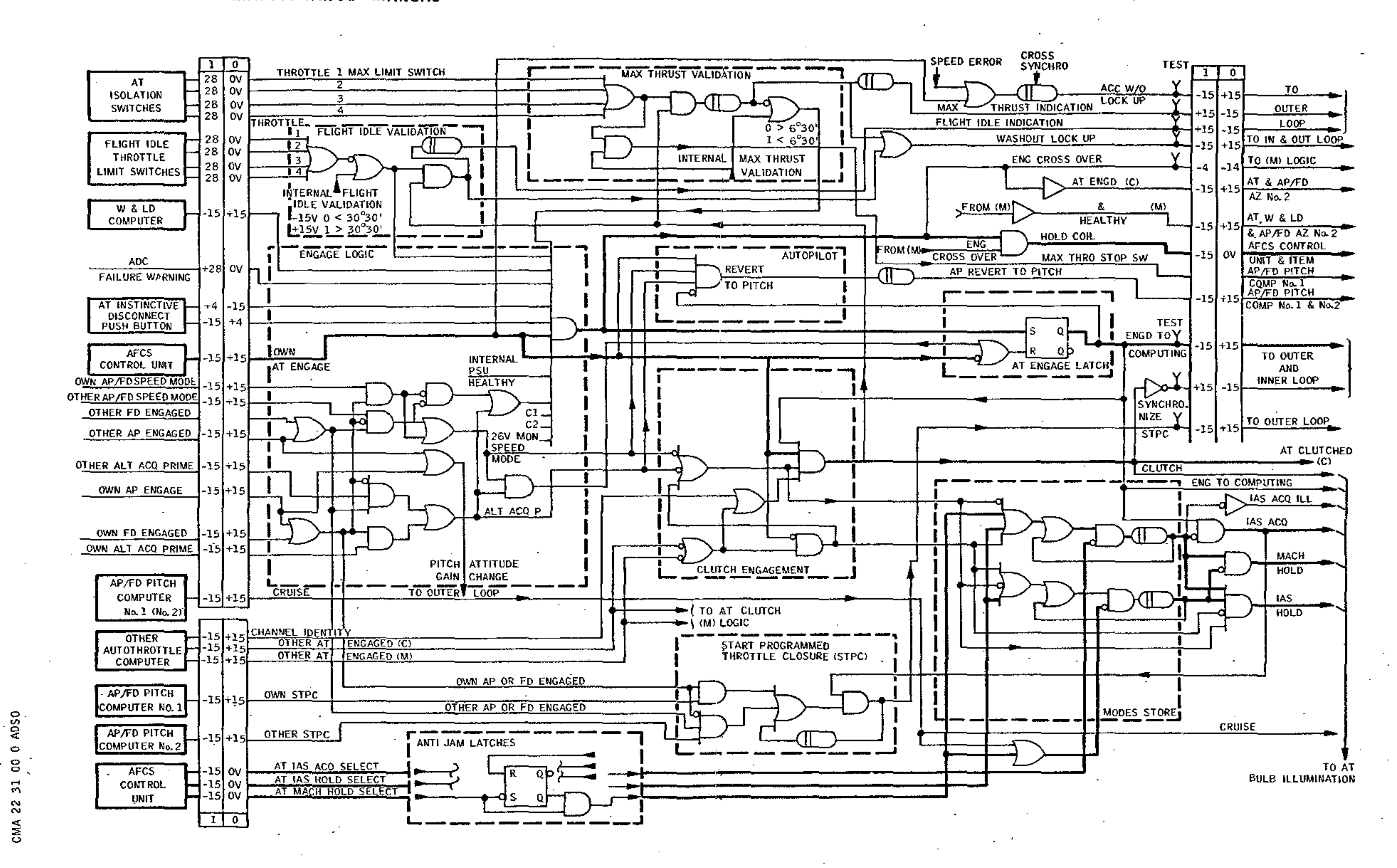
- The FTCM rate-limit amplifier limits throttle control lever displacement speed in maximum thrust, idle, synchronization or precision conditions (washout lockup).
- The error amplifier receives error signals for the various operation modes of the autothrottle, and signals from the AFCS datum adjust unit.
- The clock and variable gain generator card produces the amplitude reference loss warning signal and square-wave, gain adjustment, amplitude reference and demodulation reference signals.
- The position return amplifier circuit demodulates the throttle control lever position signals, senses their level, then after filtering and summing, sends them to the power amplifier and C1 comparators.
- The datum adjust circuit receives a 400 Hz demodulation reference with an 8° phase lead to issue pulses to a digital counter provided with stores. The logic state of this store is altered by pilot action on the datum adjust unit (IAS HOLD and MACH HOLD modes). This store is reset to zero on engagement or change of mode.
- The self test module adapts the signals between the circuits to be tested and the ITEM by means of coding and decoding circuits.

R (4) Logic circuit boards (Ref. Fig. 004)

These circuit-boards are composed of two sub-assemblies one of which is situated in the upper section of the computer, the other in the lower section of the computer. On each board there are calculation and logic amplifier interface circuits.

The logic computation circuits are as follows :

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Logic Block Diagram
Figure 004

(a) The throttle lever microswitch validation circuits, for minimum position (FLIGHT IDLE VALIDATION) and maximum position (MAX THRUST VALIDATION) condition autothrottle engagement and FTCM operation in the outer loop.
A MAX THRO STOP SW logic signal is sent to the AP/FD pitch computer when the throttle control levers are at the maximum thrust position.

(b) The WASH OUT LOCKUP circuit, which controls wash out neutralization on throttle control lever position return in order to obtain an FTCM output which is compatible with the change in the servo loop feedback. It is controlled through a logic signal from either validation circuit.

(c) The ACCELEROMETER WASHOUT LOCKUP circuit, which issues a signal which improves feedback on engagement, as a function of the speed error from a 12/6 knots level switch.

(d) The ENGAGE LOGIC circuit, which allows autothrottle engagement, provided all engage logic conditions are met. These logic conditions are described in paragraph 4, dealing with the AFCS control unit.

(e) The CLUTCH ENGAGEMENT circuit, which sends the clutch control signal to the actuator.
The actuator is clutched on engagement of the associated AT if that lane is in control.
It is decluted on selection of ALT ACQ or MAX CLIMB mode (ALT ACQ PRIME condition), or of an AP/FD speed mode.
This signal changes state on AP/FD MAX CRUISE mode engagement, thus allowing actuator clutching.

(f) The AUTOPILOT REVERT TO PITCH circuit, which controls AP or FD change-over to PITCH HOLD mode when the autothrottle is engaged in a speed hold mode.

(g) The START PROGRAMMED THROTTLE CLOSURE (SPTC) circuit, which sends the automatic throttle reduction signal to the FTCM only when the associated AP/FD pitch computer issues this signal and IAS ACQ mode has been decoded. This signal is locked after a delay of 500 ms.

(h) The MODE ENGAGEMENT circuit for selection of the three autothrottle modes. On engagement, IAS ACQ is automatically selected. On selection of another

mode, the two latch circuits go to the appropriate logic state and the selected mode is decoded. After decoding, the selected mode push-button illuminates.

R C. Operation (Ref. Fig.005 and 006)

(1) AT disengaged

(a) The Full Time Command Modifier (FTCM) output carries out a fast synchronization (360°/second) on the throttle control lever position in order to avoid jerks on engagement. When the throttle control levers are below the 36° - 30' position, a detector locks the integrator output voltage at a value corresponding to 36° - 30'. This feature is intended to set the throttle control levers systematically to this value on engagement, so as to be outside the range where the thrust/lever position ratio is very low.

(b) The actuator receives no signal. None of the clutches are activated (actuator and ADC). The system receives no speed error signal, but does receive the acceleration signal and the roll and pitch attitude signals. The datum adjust store is at zero.

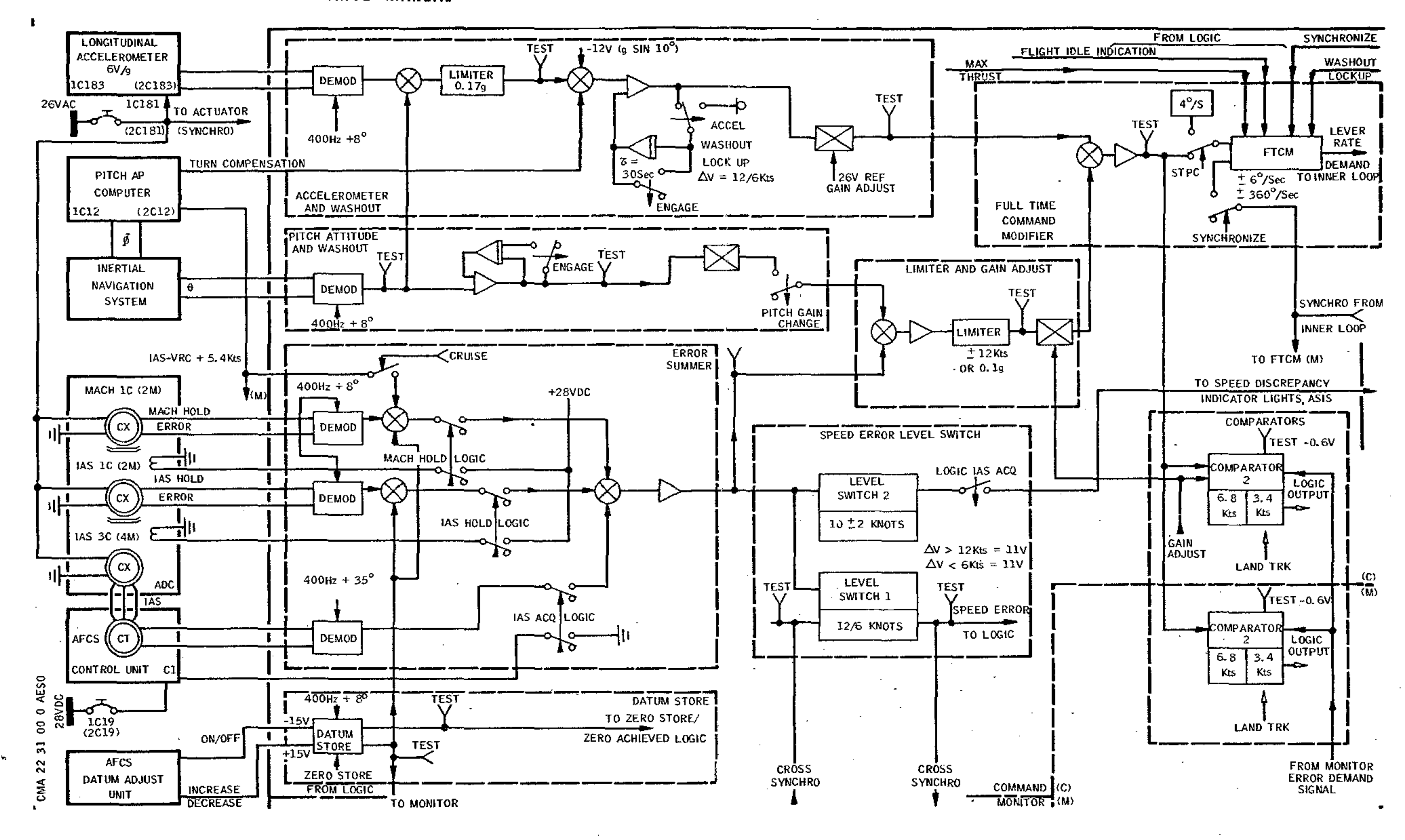
(2) AT active and engaged.

(a) This applies for lane 1 when both lanes are engaged, or for one lane if it alone is engaged, except in automatic altitude acquisition phase when both lanes may be pre-engaged.

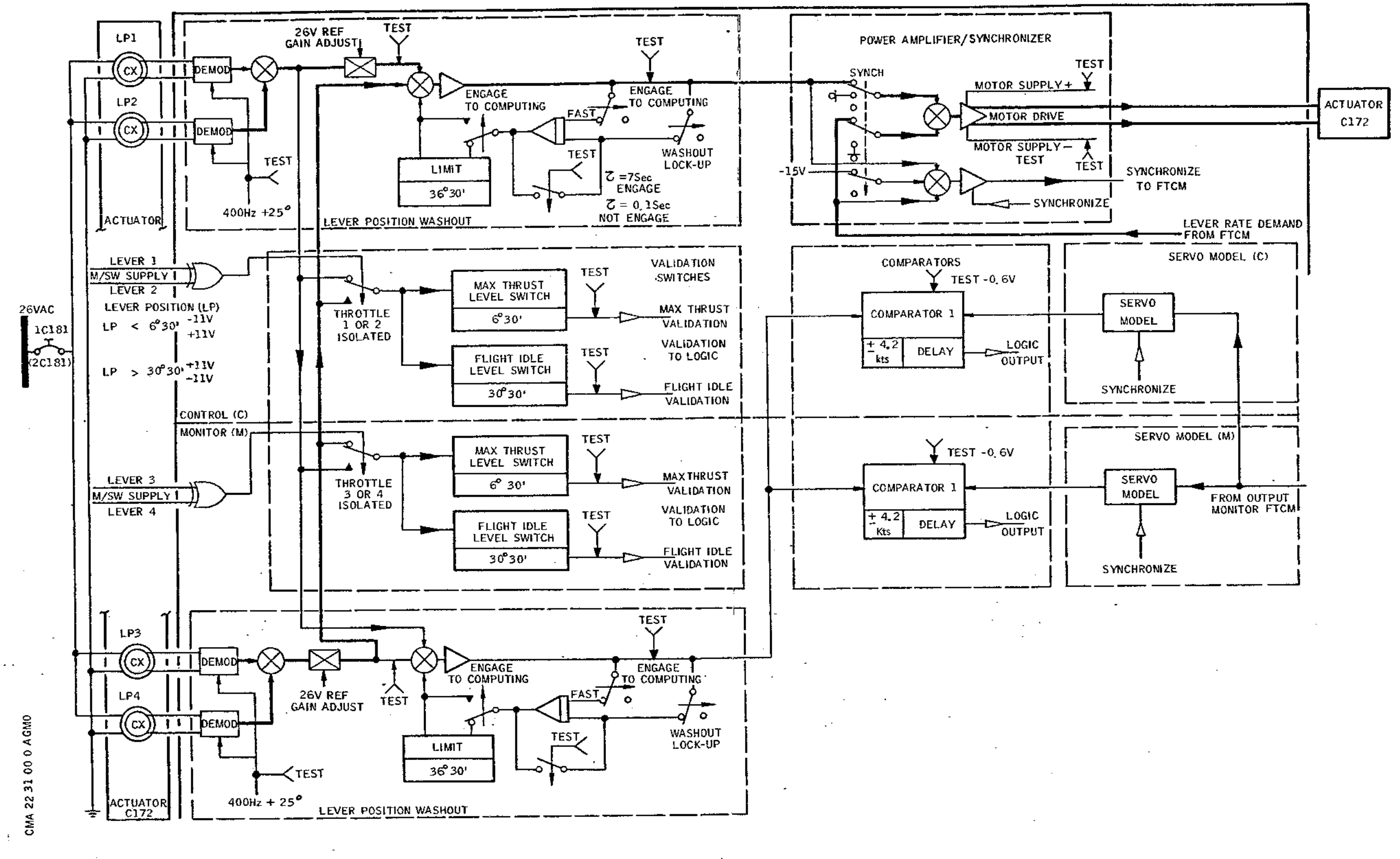
(b) The throttle control lever displacement orders are generated from speed error, pitch attitude variations, longitudinal accelerations and a turn compensation term provided by the roll signal.

(c) The pitch attitude signal, after demodulation and wash-out (time constant 5 seconds), provides a compensation term to the control error term by phase advance in order to reduce speed effects when the aircraft pitch attitude varies. These two signals are mixed upstream of an amplitude limiter. When the AP is not engaged, the phase-advance compensation term is divided by two.

(d) At the output of the amplitude limiter, and thus at the input of the FTCM, a washed-out resultant



Outer Loop - Schematic
Figure 005



Inner Loop - Schematic
Figure 006

signal (time constant 30 seconds) is added ; this signal consists of a longitudinal acceleration signal compensated by the demodulated pitch attitude signal and a turn compensation term depending on the order.

NOTE : The system authority is limited to an aircraft acceleration of ± 0.1 g.

(e) The two signals previously described form a control signal which is speed limited (throttle lever displacement limited to ± 6°/sec.) in the FTCM. This signal is then applied to the power amplifier incorporated in the throttle system outer loop before being sent to the AT actuator, thus the actuator control signal is an error signal corresponding to the difference between the FTCM output (demanded speed) and throttle control lever position return (existing speed).

(f) The throttle lever position feedback signal is washed-out to control throttle lever displacement. This wash-out, which is active in all the modes, provides integration on the control circuit. When a throttle control lever reaches an electric stop (MAX THRUST or FLIGHT IDLE), the FTCM, which has a limit of ± 6°/second, stores the value at this moment at the output as long as the order does not change sense, and the wash-out is suppressed (wash-out lockup). The result is to disable any further order sent to the throttle actuator as long as the demand signal does not change sign, and to maintain an active comparison. As soon as the signal sign changes, the system becomes normal.

(3) AT in stand-by

(a) Lane 2 is in standby when lane 1 is in control ; lane 1 has priority over lane 2 which is synchronized, with the computation channel switched in the same mode.

The computer receives all control signals and calculates an order as if it were engaged.

(b) However, this order is not transmitted to the throttle actuator but the FTCM output is synchronized with the throttle control lever position return.

(4) AT pre-engaged

The AT is pre-engaged in two cases :

(a) When the pilot engages the AT when the AP/FD is in a speed mode (IAS HOLD, for example) with ALT ACQ mode selected (ALT ACQ PRIME condition). The AT is synchronized in the same way as with the system disengaged.
The AT engages automatically in the IAS HOLD mode on altitude capture (ALT ACQ prime indicator light extinguishes, ALT ACQ push-button illuminates).

(b) When the pilot engages the AT with the AP/FD in MAX CLIMB mode.
The AT engages automatically in MACH HOLD mode when the AP/FD changes over automatically to MAX CRUISE mode (Ref. Paragraph 10, MACH HOLD mode Operation).

(5) Summary of system configurations

	SYSTEM CONFIGURATION			
FUNCTION	DISENGAGED	ACTIVE	STANDBY	PREENGAGED
MODE ENGAGED	NO	YES	YES	NO
DEMAND COMPUTATION	NO	YES	YES	NO
SYNCHRONIZATION	YES	NO	YES	YES
SUPPLY TO ACTUATOR	NO	YES	NO	NO
MONITORING ACTIVE	NO	YES	YES	YES
HOLD COILS ENERGIZED	NO	YES	YES	YES
CLUTCHING	NO	YES	YES	NO

SYSTEM CONFIGURATION

FUNCTION	DISENGAGED	ACTIVE	STANDBY	PREENGAGED

4. Control Unit - AFCS

A. Description

Components used for the autothrottle system control are grouped on the LH side of the AFCS control unit located in the glareshield instrument panel. These are :

- One engage switch for each lane (AT1, AT2), installed in a housing
- Three mode selection push-buttons : IAS HOLD, MACH HOLD and IAS ACQ.
- One speed select unit.

B. Operation

(1) Engage switch (Ref. Fig. 007)

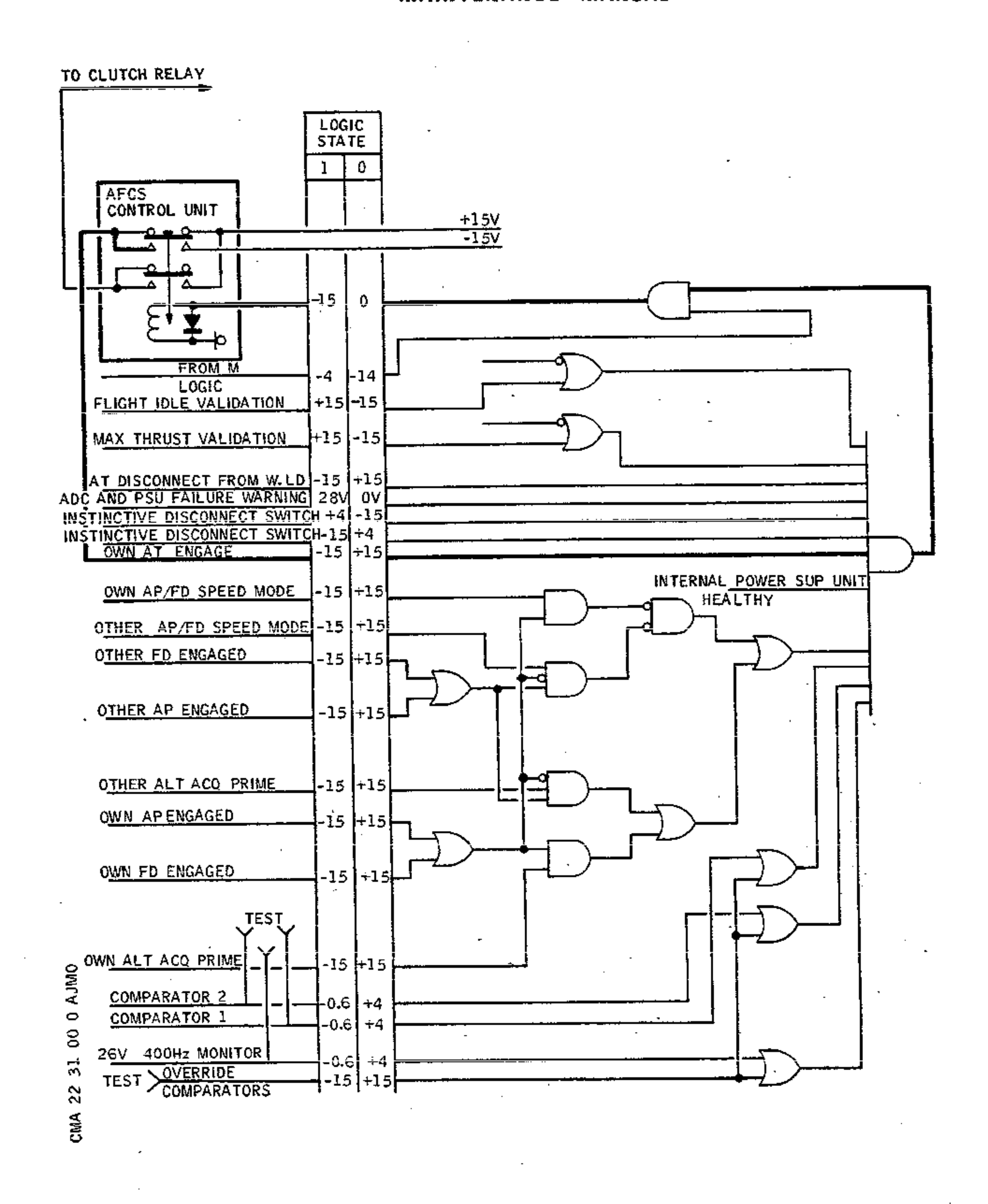
Each engage switch is held in the engaged position if the system logic enables the control and monitoring coils to be energized (- 15 V present) and the engage conditions are fulfilled. These conditions are the following :

- Engage switch in the engaged position
- Compatibility of the modes engaged with the AP/FD (AP/FD SPEED MODE) signal except in altitude acquire prime condition
- Instinctive disconnect push-buttons not activated
- Air data computer healthy
- No AT disengagement signal from W & LD system
- C1 and C2 comparators healthy
- 26 volt (monitoring) healthy
- Internal power supply monitoring healthy
- MAX THRUST limit microswitches validated
- FLIGHT IDLE limit microswitches validated.

(2) Mode selection push-buttons (Ref. Fig.008 and 004)

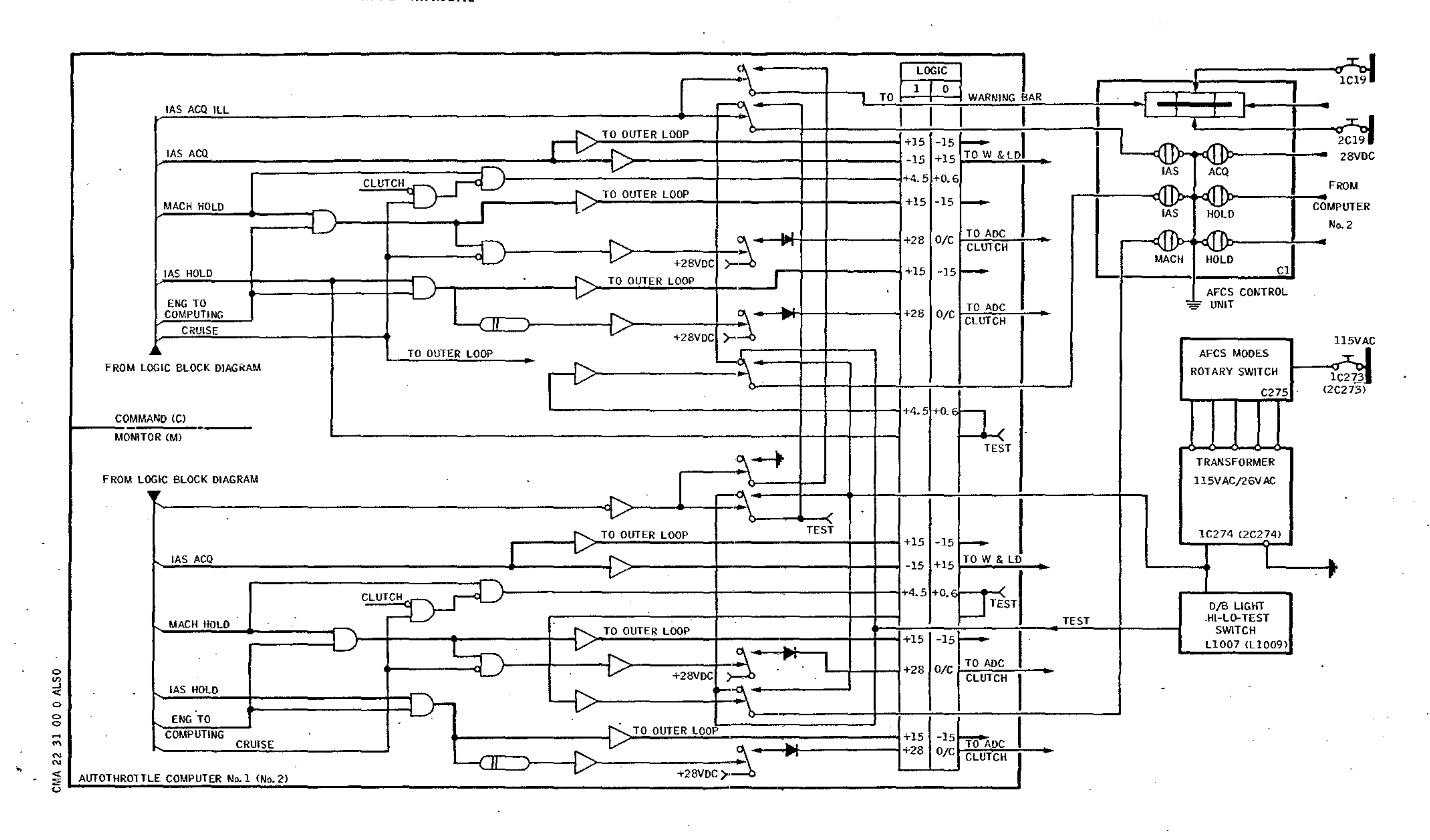
As soon as one AT lane is engaged, the basic mode engages and the IAS HOLD push-button illuminates. Another mode (MACH HOLD or IAS ACQ) can be selected by pressing the corresponding push-button. Engagement of the new mode is indicated by the push-button corresponding to the mode previously engaged extinguishing, while the push-button which is pressed illuminates (The basic mode can be selected again).

The MACH HOLD mode is used when the AP/FD is in the MAX CRUISE mode.
In this configuration the MACH HOLD push-button illumi-



Autothrottle Engage Logic
Figure 007

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AT Bulb Illumination and Mode Decoding
Figure 008

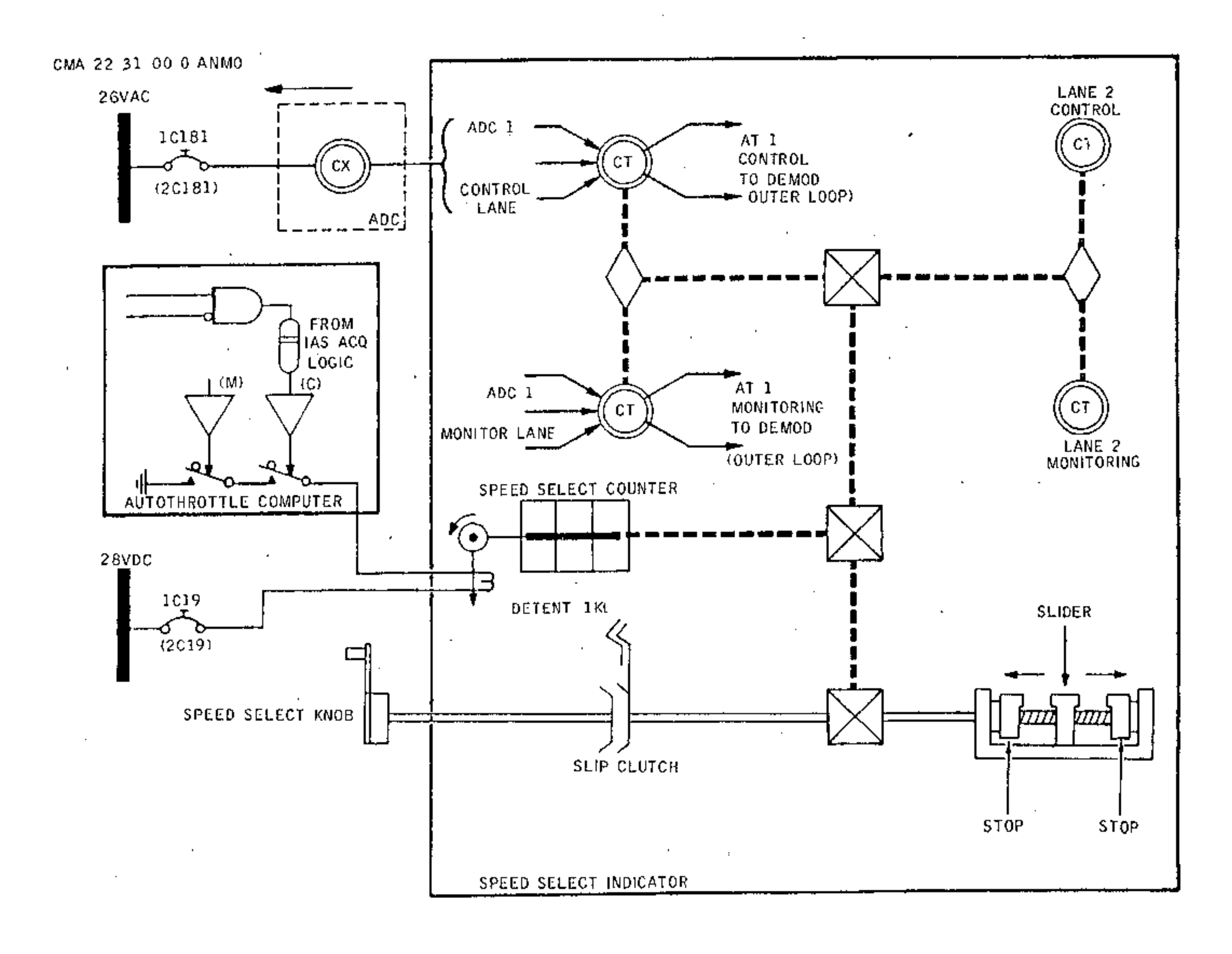
nates automatically in one of the following cases :

- On AP/FD change-over to MAX CRUISE mode.
- Presence of an overspeed deviation.
- When the throttle control levers are not at the maximum electrical stop.

For this function the AT makes use of two logic signals (CRUISE and AP/FD SPEED MODE) generated in the AP/FD pitch computer (Ref. 22-12-00, Description and Operation, paragraph 5E).

(3) Speed select unit (Ref. Fig. 009)

The speed select unit (IAS ACQ mode) consists of a SPEED SELECT knob integral with a drive shaft which alters the 3-digit counter display and also the position of the synchro rotors mounted differentially with the synchros transmitters in the ADCs. There are four of these synchros (two per lane, control and monitoring). The display range is limited by stops (130 Kts to 400 Kts) and, when the IAS ACQ mode is not selected, a bar appears on the counter.
One turn of the input shaft corresponds to 20 Kts display, with one detent per knot.



Speed Select Principle
Figure 009

5. Datum Adjust Unit - AFCS

A. Description

The autothrottle adjustment control is installed in a unit common to the autopilot and the autothrottle. This unit installed in the centre console. Adjustments are carried out with a toggle switch which returns automatically to its middle position, and enables the selected speed or mach value to be adjusted in IAS HOLD and MACH HOLD modes.

B. Operation

When this switch is operated, switching signals change the store state of a digital counter. After digital/analog conversion, the adjustment order is summed with the signals from the IAS HOLD and MACH HOLD demodulators.

6. Accelerometer - Longitudinal

A. Description

The accelerometer consists of a pendulum weight suspended on a movable frame with one degree of freedom and provided with torsion bar mechanical return. The sensitive axis symbol engraved on the housing cover is directed along the aircraft longitudinal axis with a 10° nose-down slope with respect to this axis.
This slope is compensated in each computer by a pitch attitude term.

B. Operation

The accelerometer consists of two inductive detectors connected respectively to the control and monitoring channels of the autothrottle computer. Each detector generates a voltage proportional to the acceleration sensed along the sensitive axis.
The scale is 6V per g of acceleration.

During the test phase of this equipment, a coil energized from the computer enables an acceleration to be simulated by moving the movable element of the accelerometer.

The integrity of each accelerometer is monitored by its associated computer, which compares the control and monitoring accelerometer signals. Each accelerometer is supplied with 26VAC - 400 Hz transmitted via an aircraft circuit breaker and sent to the computers.

7. Actuator - Autothrottle
(Ref. Fig.010 and 011)

A. Description

The actuator is divided into three compartments to separate the components.

(1) One electrical compartment comprising.

(a) Two motors each supplied with DC and controlled by their associated computer.

(b) Two engage clutches and 8 isolation clutches supplied with 28VDC.

(c) Eight throttle lever position recopy synchros supplied with AC (26VAC - 400 Hz), i.e. two per trottle control lever.

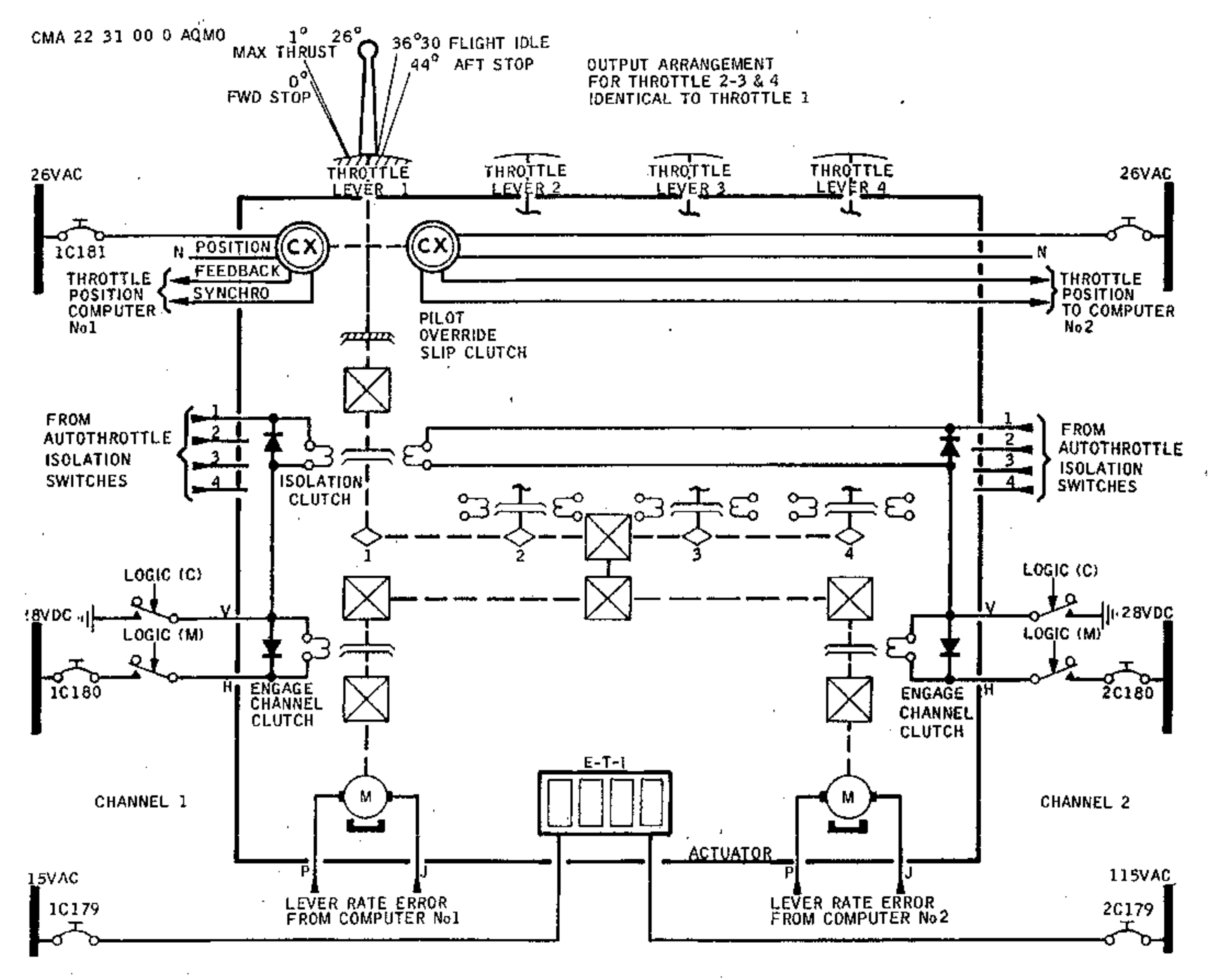
(2) One mechanical compartment containing the four output levers with their slip clutches.

(3) Another mechanical compartment divided into three sections.

(a) One section comprising gears driven by motor No.1.

(b) One section comprising gears driven by motor No.2.

(c) One section comprising gear drive distribution to each throttle control lever via isolation clutches



Throttle Actuator - Schematic
Figure 010

EFFECTIVITY: ALL

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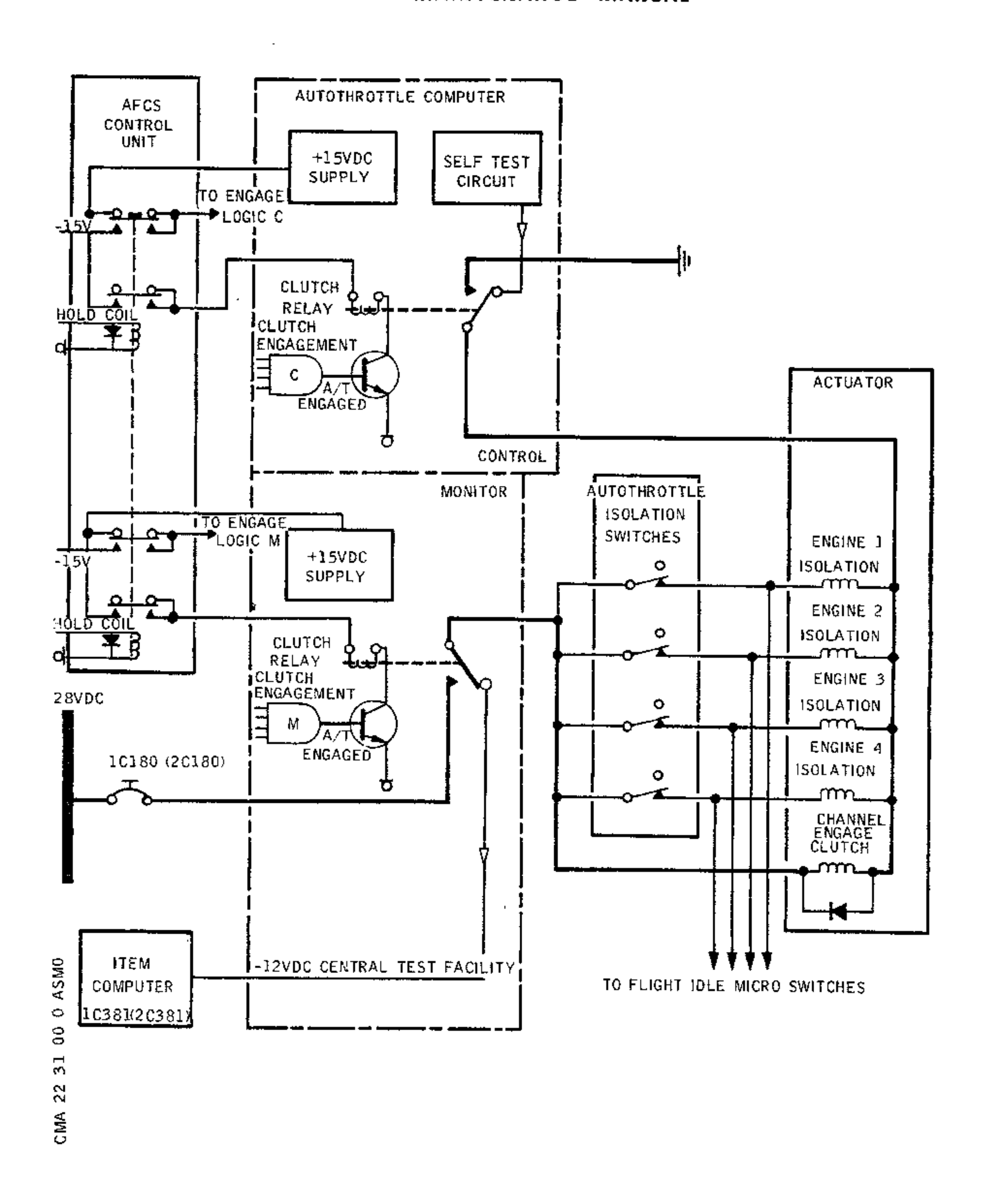
B. Operation

Each of the 4 actuator output levers drives two synchros ; (one for lane 1 and one for lane 2). These synchros transmit a position feedback signal for the corresponding throttle control lever to the relevant computer.

When the automatic control system is engaged, the engage clutch and the four isolation clutches of lane 1 enable the throttle control lever to be driven via the slip clutches.

This slip clutch permits thrust adjustment on one engine without involving autothrottle system disconnection and also provides flight safety in case of jamming.

An elapsed time meter supplied with 115VAC shows the actuator operation time.



Operating Principle
Autothrottle Actuator Engagement
Figure 011

8. Switches - Isolation
(Ref. Fig. 012)

There are four isolation switches, one for each engine. In flight, when a defective engine stops, the associated throttle control lever can be freed from the servomotor output shaft by means of an isolation clutch. This clutch is controlled by its associated isolation switch located on the ceiling panel.

Operation of this switch causes :

- Declutching of the throttle control lever which is freed and is not affected by orders from the autothrottle computer (28 VDC cut-out)
- Inhibition of the STOP logic signal (high or low stop) in order to enable the other three throttle control levers to be moved back and forth whatever the position of the fourth throttle control lever (when an engine is defective, the throttle control lever is placed at the low mechanical stop).

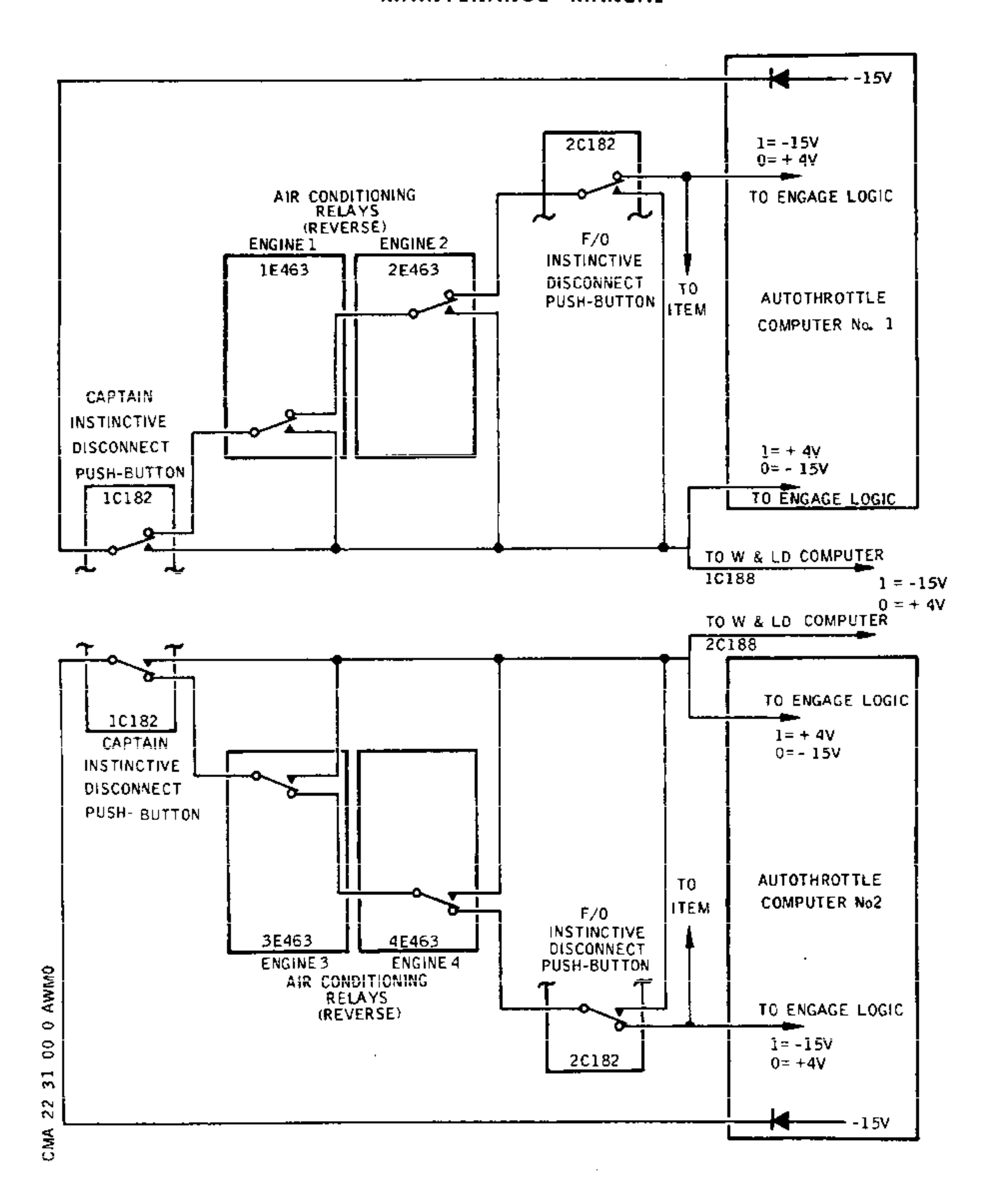


Throttle Lever Isolation Operation Principle
Figure 012

9. Push-Buttons - AT Instinctive Disconnect (Ref. Fig. 013)

Each outer throttle control lever (1 and 4) carries on its end a push-button enabling both AT lanes to be disconnected by the pilot with a first depression ; a second depression of this push-button cancels the warning caused by the AT system disconnection.

Reverse select relays 1E463 - 2E463 - 3E463 - 4E463 in engine relay boxes located under the floor in zones 19-213 and 20-213 inhibit AT engagement, via the instinctive disconnect circuit, when the engines are in thrust reverse operation.



Schematic - AP Instintive Disconnect
Push-Buttons
Figure 013

10. Operation
(Ref. Fig. 014)

A. The autothrottle controls the aircraft using IAS or Mach signals supplied by ADC clutchable synchros, speed signals displayed on the AFCS control unit, reference cruising speed (VRC) signals from the the AP/FD pitch computer, roll attitude signals supplied by the INS, and longitudinal acceleration signals.

B. The pitch attitude signals provide :

- correction of accelerometer signals.
- compensation through speed error signal phase lead in order to reduce the effects of an altitude change.

C. The accelerometer signals improve system response, in particular by limiting deceleration.

D. Addition of a turn compensation term, using the roll signal, improves performance in turns and maneuverability during approach with high load factor.

E. The control channel of the computer controls the throttle control lever position via an actuator common to both lanes. This actuator is supplied with error signals via a high gain amplifier. The error signal is the difference between the position feedback signal (or average position of the four throttle control levers) and the command signal.

F. Logic signals between the AP/FD system and the AT system make it impossible for these two systems to control speed simultaneously.

G. Mode Operation

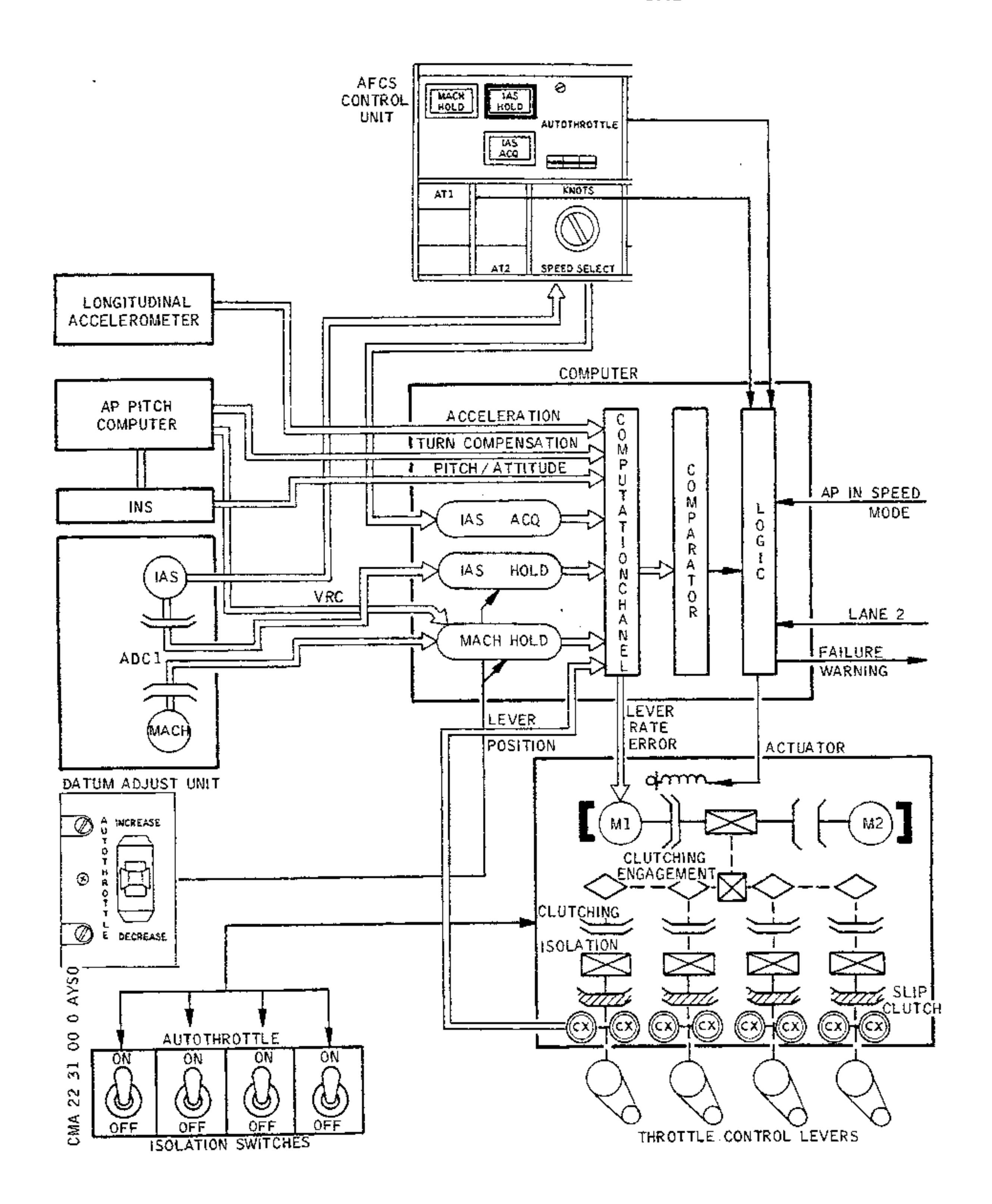
(1) Before engagement

The AT system is synchronized in order to avoid a thrust variation on engagement.

The throttle control levers are not clutched with the autothrottle actuator and may be operated by the pilot.

The AT computers receive attitude, acceleration and throttle control lever position data ; data generated by the ADC (Mach and Speed) is suppressed at the input of the computers.

(2) After engagement



Principle of Operation
Figure 014

Three modes are available

(a) IAS HOLD mode

This is the basic mode of the system.

As soon as the engage switch is placed in the ON position, the IAS HOLD push-button must illuminate and the autothrottle system is automatically activated in IAS HOLD mode, except in the altitude acquisition primed condition where it remains in standby until the capture phase, with the autopilot in a speed holding mode and in the alt acq prime condition.

In this mode, the autothrottle system holds the speed existing on engagement. This speed can be adjusted.

The speed is adjusted by the pilot by means of the INCREASE-DECREASE switch. The existing speed can be adjusted between + 22 Kts and - 22 Kts. The speed of variation is 2.2 Kts per second and depends on the duration of switch actuation. The IAS HOLD mode is available for any aircraft speed.

(b) MACH HOLD mode

The MACH HOLD mode operates in one of two conditions.

(b1) Normal operation

The mode is engaged by pressing the MACH HOLD push-button ; this causes the push-button of the mode previously selected to extinguish and illuminates the MACH HOLD push-button.

With this type of operation, the autothrottle maintains the Mach existing on engagement, though this can be adjusted.

As in the IAS HOLD mode, the pilot can adjust Mach datum by operating the INCREASE-DECREASE switch. The Mach datum can be adjusted by + 0.056 Mach to - 0.056 Mach, at a variation rate of 0.005 Mach per second of switch operation.

(b2) Special case (Ref. Fig.004 and 008)

This occurs when the AP/FD is in the MAX CLIMB and MAX CRUISE modes (Ref. 22-12-00, Description and Operation).

- In the AP/FD MAX CLIMB mode with the AT engaged, the AT is armed. None of the AT push-buttons are illuminated, and the throttle control levers are not clutched to the actuator.

- In the AP/FD MAX CRUISE mode, the AP does not have enough authority to absorb reference cruising speed (VRC) overspeeds quickly with constant thrust. The autothrottle is therefore used to correct the overspeed. It is used to reduce the thrust if VRC is exceeded.

At the change-over point, a logic signal generated in the ADC causes the MAX CRUISE mode to engage automatically. This causes the throttle control levers to be clutched and the autothrottle MACH HOLD push-button to illuminate.
Though the MACH HOLD push-button is illuminated, the Mach synchros are not clutched. The autothrottle immediately holds the same signal as the AP, i.e. VRC. A factor of 5.4 knots is then added progressively, causing the autothrottle to tend to hold a speed of VRC + 5.4 knots. The INCREASE-DECREASE switch is not operational, as any action on this switch would disturb the difference of 5.4 knots between the speeds held by the AP and the AT, and would thus be prejudicial to correct operation of the mode.

The AT is automatically declutched 100 seconds or more after it is clutched, when the throttle control levers are at the maximum electric stop position and the overspeed has been reduced (IAS-VRC <2.7 knots).

Afterwards with the AP in MAX CRUISE mode and the AT armed the throttle control levers are clutched and the MACH HOLD push-button illuminates as soon as an aircraft overspeed appears (IAS-VRC > 5.4 knots).

(c) IAS ACQ Mode

This mode is engaged by pressing the IAS ACQ push-button ; this action exinguishes the push-button of the mode previously selected and illuminates the IAS ACQ push-button.

In this mode, the autothrottle system controls the aircraft at the speed selected on the SPEED SELECT counter on the AFCS control unit. The pilot may alter the selected speed after or before this mode is engaged.

The selected speed information (S.S) is compared with the indicated airspeed (IAS) issued by the ADC. The signal corresponding to the difference between those two speeds is sent to the auto-throttle computer ; if the difference is null, the system is balanced. When the difference is greater than 10 Knots ± 2, two amber indicator lights integral with the Captain's and First Officer's airspeed indicators illuminate.

Speed selection is possible from 130 Knots up to 400 Knots. Acquisition of the selected speed is carried out through a longitudinal acceleration which does not exceed 0.1 g.

This mode is mostly used in approach. It must be selected in order to enable the automatic landing system to be provided with LAND 3 and LAND 2 capabilities.

(3) Start programmed throttle closure (SPTC)

During flare, when the landing is achieved with the flight director or autopilot, the autothrottle system moves the throttle control levers to the minimum electric stop position at 36°30 at a radio altitude of 15 feet, if the IAS ACQ mode has been selected. This closure is achieved at a throttle displacement speed of 4°/second.

(4) Autothrottle operation, the autopilot system being engaged in ALT ACQ mode.

For safety reasons, it is necessary to have a speed hold mode in the altitude acquire phase, which is provided by the autothrottle system.

With the autopilot ALT ACQ mode selected (prime indicator light illuminated under the push-button), three cases must be considered :

(a) Autopilot engaged in a mode other than Mach or speed hold and autothrottle engaged.
The autothrottle will hold the speed during all the capture phase.

(b) Autopilot engaged in speed or Mach hold mode and autothrottle engaged.

(b1) During the capture phase, the autothrottle is engaged but not active (no mode illuminated) ; the autopilot holds the speed.

(b2) On the AFCS control unit, in capture phase :
- ALT ACQ push-button illuminates
- AP speed mode extinguishes
- AT IAS HOLD push-button illuminates.

H. Monitoring

Each autothrottle lane comprises one control and one monitoring channel which are strictly identical and use independent information.

There are three types of monitoring :

- Internal monitoring
- External monitoring
- Connection monitoring

(1) Internal Monitoring (Ref. Fig. 015)

This monitoring is carried out at four levels :

(a) Power supplies

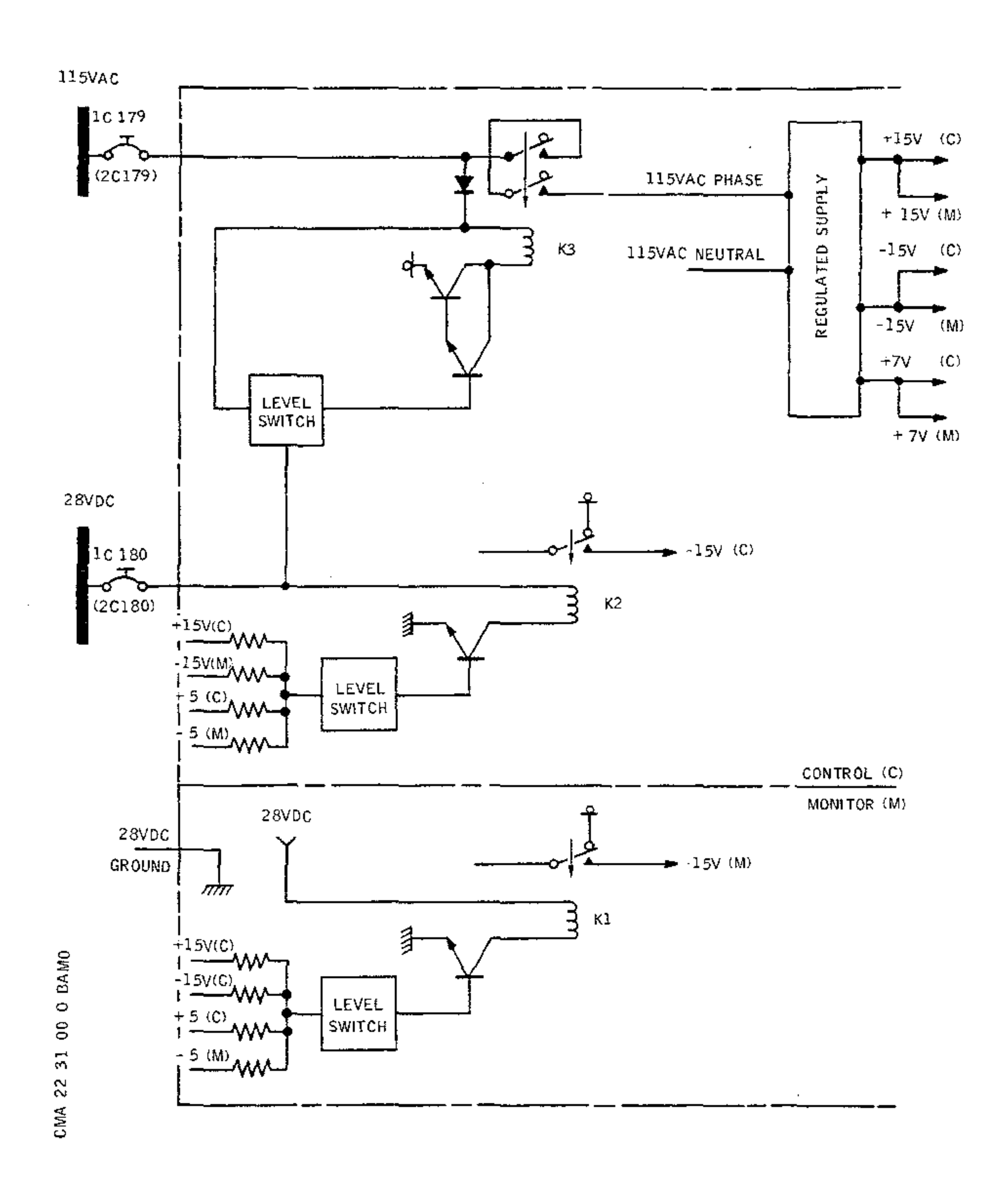
The + 15VDC, - 15VDC, + 4.5VDC power supplies are monitoring by means of two level switches checked by the self-tests.

The 28VDC and 115VAC - 400 Hz power supplies are monitored by a level switch which also detects ground cut-outs.

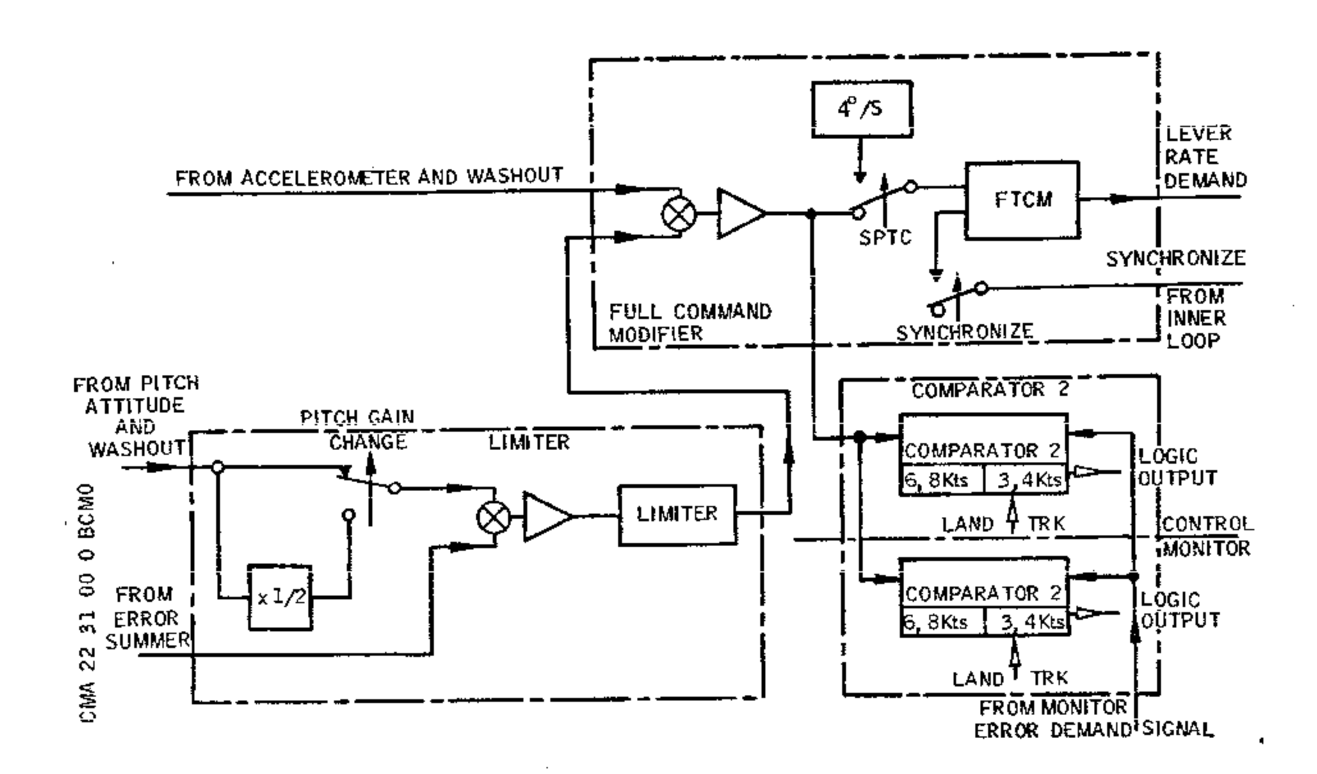
Each computer receives one 26VAC - 400 Hz power supply which goes through the associated accelerometer. This voltage is monitored.

(b) Command signal computation (comparator C2) (Ref. Fig. 016)

This duplicated comparator compares the speed



Power Supply Monitoring
Figure 015

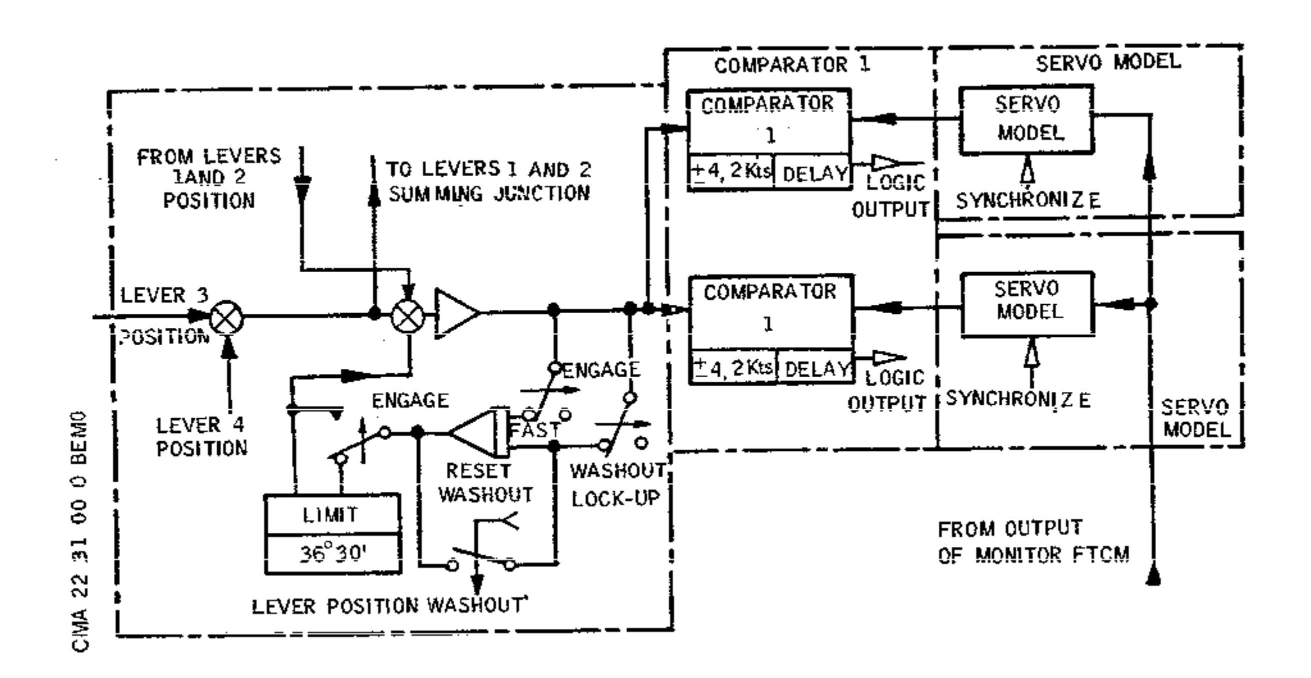


Integration of C2 Comparator in the Outer Loop
Figure 016

error signals issued by both computation channels (control and monitoring). At the output, it generates a fault signal (logic state 0) if the difference is greater than a reference value of ± 6.8 Knots or ± 3.4 Knots during landing with the AP/FD.

(c) Power stage (comparator C1) (Ref. Fig. 017)

This duplicated comparator compares the throttle control levers average position return with a position signal calculated by means of a duplicated servo model. If the difference is greater than ± 4.2 Knots, the generator generates a fault signal at its output (logic state 0).



Integration of C1 Comparator in the Inner Loop
Figure 017

It should be mentioned that the comparators do not detect failure in certain components which are common to the control and monitoring channels ; these components are the following :

- The throttle control lever position return synchro-detectors with their associated demodulators
- The synchronization amplifier
- The datum adjust speed control.

(d) End-of-Travel Microswitches

It is necessary to monitor the operation of the end-of-travel limit microswitches used to limit throttle control lever travel.
It is indispensable to prevent the actuator from driving the throttle control levers to the mechanical stops situated beyond the electrical stops (minimum 36° - 30' maximum 1°).

To achieve this monitoring, the microswitch configuration is checked when the throttle control levers are in mid-way position.

In order to validate the microswitch maxima and minima operation, comparison signals are derived from the position feedback signal of each throttle control lever. If there is a discrepancy between the microswitch action and the IDLE or MAX. THRUST validation signal, the lane is disengaged. The level switch analog input is routed according to the isolation condition of the throttle control levers in order to ensure that a throttle control lever isolation does not affect operational integrity.

(2) External monitoring

This monitoring is carried out as follows :

(a) By means of the inertial signals comparator unit (ISCU), using inertial data generated by the inertial navigation systems (INS), as the autothrottle uses roll and pitch attitude terms from the INS's. The ISCU provides a warning.

(b) By each INS which provides a warning by means of its self-monitoring circuit.

The ISCU warning results in autothrottle disengagement below an altitude of 600 feet if the pitch and roll attitude difference between one INS and the two others reaches or exceeds five degrees. The INS self-detected warning disengages the autothrottle system as soon as the INS's are engaged.

The combination of the two warnings and the '600 feet' logic state is achieved in the warning and landing display computers which issue the disconnect control signal to the autothrottle.

(3) Connection Monitoring

(a) Accelerometer

The 26VAC - 400 Hz signal from the computer is routed through the accelerometer enabling monitoring of its connections.

(b) Autothrottle actuator

Its connections are monitored through the servo-amplifier monitoring when the system is activated.

(c) AFCS control unit

Its disconnection prohibits engagement because of the hold coil supply cut-out.

Moreover, a control or monitoring failure leads to the power supply of the two holding coils being cut off.
Engagement switch disengagement cuts the power supply and the clutch relay coils control signal.

C. Warnings and Indicating

In normal operation both channels are engaged simultaneously. The engagement condition of the two lanes is displayed to each pilot by means of the warning and landing display indicators.

- If (intentionally or not) one lane disengages when both were engaged, disengagement of this lane is indicated only by the fall of the associated engage switch.
- If both lanes disengage (intentionally or not) the two red AT warning lights on the W & LD indicators flash.
- If at least one lane is disengaged, when the AP or FD system is engaged in ALT ACQ mode or in GLIDE beam capture phase, warning is triggered and displayed as indicated above : the red AT warning lights flash.

The AT warning can be cancelled in three ways :

(1) Press either AT warning light on the W & LD indicators (Captain's or First Officer's instrument panel).

(2) Press either instinctive disconnect push-button (on throttle control levers 1 or 4).

(3) Engage one lane of the autothrottle in IAS ACQ mode.

In order to obtain LAND 2 and LAND 3 status on the W & LD indicator, at least one autothrottle lane must be in IAS ACQ mode during automatic approach. On loss of both autothrottle lanes or if neither lane is engaged, the AUTOLAND warning light will illuminate when the altitude is below 600 feet if LAND or GLIDE mode is selected, with at least one AP channel engaged.

D. Tests

The autothrottle computers comprise circuits which may be tested when the aircraft is on the ground (shock absorbers compressed)(TEST mode) by means of the ITEM. Circuits associated with W & LD system can be tested either by means of the ITEM system or by W & LD internal test.

Coding and decoding circuits enable the computer inputs to be isolated by means of binary sequence signals controlled by the ITEM computer or the test set, then actuation signals are applied to the computation channels.

The points tested sequentially are as follows :

- Comparator and level switch thresholds
- Proper operation condition of control circuits and monitoring of each computer up to the power amplifier
- Longitudinal accelerometer response to an excitation generated by the computer
- Autothrottle actuator clutch system.

In flight (IFM mode), the binary control signals are grounded. The ITEM when operational receives signals from engage switches, interlocks and aircraft power supplies. It indicates and stores any failure which occurs in flight ; the failure display can be repeated on the ground.

11. Power Supply

The ADC synchro clutches, the end of travel microswitches, the AFCS control unit bulbs and the speed discrepancy indicator lights on the ADCs are supplied from essential busbars (28VDC). The computers, through the accelerometers, and the actuator and ADC synchros (IAS ACQ mode) are supplied from main busbars (26VAC).

The sheddable avionics busbars (115VAC) supply the actuator hour counter and computer.

SERVICE	BUSBAR		C/B PANEL
AT CONT	A ESSENTIAL	3P	1-213
AFCS 1 CONT	A ESSENTIAL	3P	1-213
AT SYS 1 SUP	A AVIONICS SHEDDABLE	10X	13-215
AT SYNCHRO SYS 1 SUP	A MAIN	12X	13-215
AT CONT	B ESSENTIAL	4P	5-213
AFCS 2 CONT	B ESSENTIAL	4P	5-213
AT SYS 2 SUP	B AVIONICS SHEDDABLE	11X	13-216
AT SYNCHRO SYS 2 SUP	B MAIN	13X	13-216

AUTOTHROTTLE - TROUBLE SHOOTING

WARNING : OBSERVE THE ELECTRICAL SAFETY PRECAUTIONS DESCRIBED IN 24-00-00, SERVICING.

1. General

The following information is intended to enable faults found in flight or on the ground to be quickly rectified.

R The autothrottle system consists of two sub-systems or channels, AT1 and AT2. Trouble Shooting procedure described is for AT1, Trouble Shooting procedure for AT2 is indicated between brackets.

A fault can be isolated with the aid of Trouble Shooting procedure (Refer to paragraph 3) by means of the ITEM system (Ref. 22-31-00, Adjustment/Test), Operational Test, paragraph 2. C), then traced through OK and NOT OK paths. If a defect occurs, perform the appropriate corrective action or refer to the chart indicated ; then, repeat the operation at which the defect was encountered to ensure that the operation is OK.

Bracketed numbers in the preparation procedures and charts indicate items on the component identification table (Ref. table 101). Component location is also indicated on this table.

All procedures dealing with trouble shooting are based on the assumption that electrical wiring is serviceable and electrical power available. If the fault is not rectified after the corrective action, check wiring in accordance with the Wiring Diagram Manual (Refer to table 101).

2. Prepare

A. Equipment and Materials

DESCRIPTION	PART NO.
SIMULATOR PRESSURE SENSORS	87209455

B. Connect electrical ground power unit and energize the aircraft electrical network (Refer to 24-41-00, Servicing).

C. Refer to the preparation of work required in the functional test of the autothrottle system (Refer to 22-31-00, Adjustment/Test, paragraph 3. B).

R 3. Autothrottle Trouble Shooting

```
R   *****************************************************
R   * Prepare system for trouble shooting as described  *
R   * in paragraph 2.                                   *
R   * On front face of autothrottle computer No.1 [1]   *
R   * (No.2 [2]), check that elapsed time indicator     *
R   * pointer is pulsating. IF                          *
R   *****************************************************
R      ||    |
R      ||    |         -----------------------------------------------------
R      ||    |        | Remove Autothrottle computer No.1 [1]                |
R      ||    |        | (No.2 [2]) from its rack.                            |
R      ||    |        | On connector 1C 171 BB (2C 171 BB),                  |
R      OK    |-NOT OK--| check that 115 VAC supply from circuit breaker      |
R      ||             | [3] ([4]) is provided between pins 7 and 6           |
R      ||             | (neutral) and that 28 VDC supply from circuit        |
R      ||             | breaker [5] ([6]) is provided between pins 5         |
R      ||             | and 3 (ground).                                      |
R      ||              -----------------------------------------------------
R   *****************************************************
R   * By means of the ITEM system TEST UNIT function,   *
R   * check Autothrottle computer and longitudinal      *
R   * accelerometer. Display data. IF                   *
R   *****************************************************
R      ||    |
R    AT PASS|          -----------------------------------------------------
R      ||    |-AT ACCL-| Replace longitudinal accelerometer No.1 [7]        |
R      OK    | NOT OK  | (No.2 [8])                                         |
R      ||    |          -----------------------------------------------------
R      ||    |
R      ||    |          -----------------------------------------------------
R      ||    |-AT COMP-| Replace Autothrottle computer No.1 [1]             |
R      ||              | (No.2 [2]).                                        |
R      ||               -----------------------------------------------------
R      ||
R   *****************************************************
R   * Place ADC1 (ADC2) switch in ON position, then     *
R   * reset.                                            *
R   * INS No.1 (INS No.2) MSU selector switch is in     *
R   * ALIGN position. On ADI, flag G is out-of-view.    *
R   * Place the four throttle control levers in mid-way *
R   * position. On AFCS control unit, engage AT1 (AT2)  *
R   * switch. Check that switch remains engaged. IF     *
R   *****************************************************
R      ||    |          -----------------------------------------------------
R      OK    |-NOT OK--| Not possible to engage AT1 (AT2) switch.           |
R      ||              | Ref. Chart 101.                                    |
R      ||               -----------------------------------------------------
```

```
R      ||
R   ***************************************************
R   * Check that LH (RH) side of IAS HOLD mode selection*
R   * push-button is illuminated. IF                  *
R   ***************************************************
R      ||    |          ------------------------------------------------
R      ||    |         | LH (RH) side of IAS HOLD mode selection        |
R      OK    |-NOT OK--| push-button does not illuminate.               |
R      ||              | Replace Autothrottle computer No.1 [1]         |
R      ||              | (No.2 [2]).                                    |
R      ||               ------------------------------------------------
R   ***************************************************
R   * Operate datum adjust unit AUTOTHROTTLE toggle   *
R   * switch in INCREASE sense, then in DECREASE sense *
R   * Check that the four throttle control levers are  *
R   * moving accordingly. IF                          *
R   ***************************************************
R      ||    |          ------------------------------------------------
R      ||    |         | Disengagement of AT1 (AT2) switch.             |
R      ||    |-NOT OK--| Replace Autothrottle computer No.1 [1]         |
R      ||    |         | (No.2 [2].                                     |
R      ||    |          ------------------------------------------------
R      ||    |          ------------------------------------------------
R      ||    |         | No displacement of throttle control levers     |
R      OK    |-NOT OK--| following datum adjust unit control            |
R      ||    |         | Ref. Chart 102.                                |
R      ||    |          ------------------------------------------------
R      ||    |          ------------------------------------------------
R      ||    |         | Any of the four throttle control levers        |
R      ||    |-NOT OK--| does not move following datum adjust unit      |
R      ||              | control.                                       |
R      ||              | Ref. Chart 103.                                |
R      ||               ------------------------------------------------
R   ***************************************************
R   * Disengage AT1 (AT2) switch                      *
R   * Align the four throttle control levers in mid-way *
R   * position                                        *
R   * Trip circuit breaker [9]                        *
R   * Check that AT1 (AT2) switch can be engaged in the *
R   * two following ways :                            *
R   * -Place ADC1 (ADC2) TEST selector switch         *
R   *  in position 1. TEST blue caption light         *
R   *  illuminates. Press ADC1 (ADC2) caption light   *
R   *  to reset.                                      *
R   * -Place ADC1 (ADC2) TEST selector switch         *
R   *  in position 2. Approximately 30 seconds later, *
R   *  press ADC1 (ADC2) caption light to reset       *
R   * Check that AT1 (AT2) switch remains engaged     *
R   * in both cases. IF                               *
R   ***************************************************
```

```
R       ||    |
R       ||    |         -------------------------------------------------
R       ||    |         | AT1 (AT2) switch does not remain in engaged   |
R       ||    |-NOT OK--| position on Ias data reception from associated |
R       ||              | ADC.                                          |
R       ||              | Ref. Chart 104                                |
R       ||              -------------------------------------------------
R   **************************************************
R   * AT1 (AT2) switch remains engaged in IAS HOLD mode *
R   * and ADC1 (ADC2) TEST selector switch in position 2*
R   * Select MACH HOLD mode.                           *
R   * Check that AT1 (AT2) switch remains engaged. IF  *
R   **************************************************
R       ||    |         -------------------------------------------------
R       ||    |         | AT1 (AT2) switch does not remain in engaged   |
R       OK    |-NOT OK--| position on Mach data reception from          |
R       ||              | associated ADC.                               |
R       ||              | Ref. Chart 104.                               |
R       ||              -------------------------------------------------
R   **************************************************
R   * Check that LH (RH) side of MACH HOLD mode        *
R   * selection push-button remains illuminated. IF    *
R   **************************************************
R       ||    |         -------------------------------------------------
R       ||    |         | LH (RH) side of MACH HOLD mode selection      |
R       OK    |-NOT OK--| push-button does not illuminate.              |
R       ||              | Replace Autothrottle computer No.1 [1]        |
R       ||              | (No.2 [2]).                                   |
R       ||              -------------------------------------------------
R   **************************************************
R   * Operate datum adjust unit AUTOTHROTTLE toggle    *
R   * switch in INCREASE sense, then in DECREASE sense. *
R   * Check that the four throttle control levers      *
R   * are moving accordingly. IF                       *
R   **************************************************
R       ||    |         -------------------------------------------------
R       OK    |-NOT OK--| Replace Autothrottle computer No.1 [1]        |
R       ||              | (No.2 [2])                                    |
R       ||              -------------------------------------------------
R   **************************************************
R   * Disengage AT1 (AT2) switch. Place ADC1 (ADC2) TEST*
R   * selector switch in position 1. Wait until TEST   *
R   * blue caption light illuminates, then press ADC1  *
R   * (ADC2) caption light to reset. Engage AT1 (AT2)  *
R   * switch. By means of SPEED SELECT switch, display *
R   * a speed of 355Kts on KNOTS counter.              *
R   * Select IAS ACQ mode. Check that AT1 (AT2) switch *
R   * remains engaged. IF                              *
R   **************************************************
```

```
R      ||    |
R      ||    |           ------------------------------------------------
R      ||    |           | AT1 (AT2) switch disengages on selection     |
R      OK    |-NOT OK--| of IAS ACQ mode.                               |
R      ||                | Ref. Chart 105.                              |
R      ||                ------------------------------------------------
R   ***************************************************
R   * Check that LH (RH) side of IAS ACQ mode selection *
R   * push-button is illuminated. IF                  *
R   ***************************************************
R      ||    |           ------------------------------------------------
R      ||    |           | LH (RH) side of IAS ACQ mode selection push-  |
R      OK    |-NOT OK--| button does not illuminate.                    |
R      ||                | Replace Autothrottle computer No.1 [1]        |
R      ||                | (No.2 [2]).                                   |
R      ||                ------------------------------------------------
R   ***************************************************
R   * Gradually increase the speed displayed on counter.*
R   * Check that AT1 (AT2) switch remains engaged      *
R   * and that the four throttle control levers are   *
R   * moving towards the max. thrust position. IF      *
R   ***************************************************
R      ||    |           ------------------------------------------------
R      ||    |           | Disengagement of AT1 (AT2) switch and/or      |
R      OK    |-NOT OK--| no displacement of throttle control levers.    |
R      ||                | in IAS ACQ mode.                              |
R      ||                | Ref. Chart 106.                               |
R      ||                ------------------------------------------------
R   ***************************************************
R   * Check that for a 365 Kt speed displayed on      *
R   * counter, the speed discrepancy indicator light   *
R   * on Captain's (First Officer's) airspeed indicator *
R   * is illuminated. IF                               *
R   ***************************************************
R      ||    |
R      ||    |           ------------------------------------------------
R      ||    |           | On Captain's (First Officer's) airspeed       |
R      ||    |           | indicator, the speed discrepancy indicator    |
R      OK    |-NOT OK--| light does not illuminate.                     |
R      ||                | Replace Autothrottle computer No.1 [1]        |
R      ||                | (No.2 [2]).                                   |
R      ||                ------------------------------------------------
```

```
R      ||
R   ****************************************************
R   * Disengage AT1 (AT2) switch.                      *
R   * Place ADC1 (ADC2) TEST selector switch in NORM   *
R   * position then reset.                             *
R   * Reset circuit breaker [9].                       *
R   * Align the four throttle control levers in mid-way *
R   * position.                                        *
R   * Place throttle control lever No.1 3° rearward of *
R   * the three others.                                *
R   * Engage AT1 (AT2) switch.                         *
R   * Operate datum adjust unit AUTOTHROTTLE toggle    *
R   * switch in DECREASE sense.                        *
R   * Check that throttle control levers are moving    *
R   * towards flight idle position, and stop when      *
R   * throttle control lever No.1 is in contact with   *
R   * associated flight idle microswitch.              *
R   * Repeat check procedure, successively placing     *
R   * throttle control lever No.2, then No.3, then No.4 *
R   * rearward of others. Check that results are       *
R   * identical. IF                                    *
R   ****************************************************
R      ||    |         -----------------------------------------------
R      ||    |        | Displacement of throttle control levers       |
R      OK    |-NOT OK--| not inhibited when a flight idle microswitch  |
R      ||             | is energized.                                 |
R      ||             | Ref. Chart 107.                               |
R      ||              -----------------------------------------------
R   ****************************************************
R   * Disengage AT1 (AT2) switch. Align the four       *
R   * throttle control levers to 15° position approx.. *
R   * Place throttle control lever No.1 3° forward of  *
R   * the three others.                                *
R   * Operate datum adjust unit AUTOTHROTTLE toggle    *
R   * switch in INCREASE sense. Check that the throttle *
R   * control levers are moving towards max. thrust    *
R   * position and stop when throttle control lever No.1*
R   * is in contact with max. thrust microswirch.      *
R   * Repeat check procedure, successively placing     *
R   * throttle control lever No.2, then No.3, then No.4 *
R   * forward of others. Check that results are        *
R   * identical. IF                                    *
R   ****************************************************
R      ||    |         -----------------------------------------------
R      ||    |        | Displacement of throttle control levers not   |
R      OK    |-NOT OK--| inhibited when a max. thrust limit microswitch |
R      ||             | is energized.                                 |
R      ||             | Ref. Chart 107.                               |
R      ||              -----------------------------------------------
```

```
R      ||
R  **************************************************
R  * Operate datum adjust unit AUTOTHROTTLE toggle    *
R  * switch in DECREASE sense.                        *
R  * When throttle control lever No.4 reaches 12°     *
R  * approximately place associated AUTOTHROTTLE      *
R  * in OFF position, then successively place isolation*
R  * switches associated with throttle control levers *
R  * No.3, No.2, and No.1 in OFF position.            *
R  * Check that each time an isolation switch is      *
R  * placed in OFF position, the associated throttle  *
R  * control lever stops. IF                          *
R  **************************************************
R      ||    |        ---------------------------------------------
R      OK    |-NOT OK--| Isolation of throttle control levers      |
R      ||              | inoperative.                              |
R      ||              | Ref. Chart 108.                           |
R      ||              ---------------------------------------------
R  **************************************************
R  * Disengage AT1 (AT2) switch.                      *
R  * Place isolation switches associated with throttle *
R  * control levers No.2, No.3, and No.4 in ON position*
R  * Place the three associated throttle control levers*
R  * in mid-way position, and throttle control lever  *
R  * No.1 in flight idle position.                    *
R  * Engage AT1 (AT2) switch                          *
R  * Check that when placing the isolation switch     *
R  * associated with throttle control lever No.1 in   *
R  * ON position AT1 (AT2) switch disengages. IF      *
R  **************************************************
R      ||    |        ---------------------------------------------
R      ||    |         | Validation of flight idle switches not correct.|
R      OK    |-NOT OK--| Replace Autothrottle computer No.1 [1]    |
R      ||              | (No.2 [2]).                               |
R      ||              ---------------------------------------------
R  **************************************************
R  * Align the three throttle control levers No.2, No.3*
R  * and No.4 in mid-way position. Place throttle     *
R  * control lever No.1 in max. thrust position and its*
R  * associated isolation switch in OFF position.     *
R  * Engage AT1 (AT2) switch.                         *
R  * Check that AT1 (AT2) switch disengages when      *
R  * placing throttle control lever No.1 isolation    *
R  * switch in ON position. IF                        *
R  **************************************************
R      ||    |        ---------------------------------------------
R      OK    |-NOT OK--| Validation of max. thrust switches not correct.|
R      ||              | Replace Autothrottle computer No.1 [1]    |
R      ||              | (No.2 ([2]).                              |
R      ||              ---------------------------------------------
```

```
R      ||
R   ****************************************************
R   * Place the four throttle control levers in mid-way *
R   * position. Engage AT1 (AT2) switch.                 *
R   * Place throttle control lever No.1 slightly         *
R   * rearward or forward of the three others.           *
R   * Check that these three throttle control levers     *
R   * are moving in the sense opposite to throttle       *
R   * control lever No.1.                                *
R   * Repeat this operation with throttle control levers*
R   * No.2, No.3, and No.4.                              *
R   * Check that results are identical. IF               *
R   ****************************************************
R      ||    |         ----------------------------------------
R      ||    |        | Throttle control lever position feedback |
R      OK    |-NOT OK--| not correct.                           |
R      ||             | Ref. Chart 109.                         |
R      ||              ----------------------------------------
R   ****************************************************
R   * Simultaneously and quickly move the four throttle *
R   * control levers to the flight idle stops.           *
R   * Check that AT1 (AT2) switch disengages. IF         *
R   ****************************************************
R      ||    |         ----------------------------------------
R      ||    |        | Manual override ineffective.            |
R      OK    |-NOT OK--| Replace Autothrottle computer No.1 [1]  |
R      ||             | (No.2 [2]).                             |
R      ||              ----------------------------------------
R   ****************************************************
R   * Align the four throttle control levers in mid-way *
R   * position.                                          *
R   * Engage AT1 (AT2) switch.                           *
R   * Press then release throttle control lever No.1     *
R   * instinctive disconnect switch.                     *
R   * Check that AT1 (AT2) switch disengages. IF         *
R   ****************************************************
R      ||    |         ----------------------------------------
R      ||    |        | Throttle control lever No.1 AT instinctive |
R      OK    |-NOT OK--| disconnect switch inoperative.         |
R      ||             | Ref. Chart 110.                         |
R      ||              ----------------------------------------
R   ****************************************************
R   * Check that AT red warning light is flashing        *
R   * on each W & LD indicator. IF                       *
R   ****************************************************
R      ||    |         ----------------------------------------
R      OK    |-NOT OK--| Ref. Trouble Shooting for W & LD system. |
R      ||             | Ref. 22-41-00.                          |
R      ||              ----------------------------------------
```

```
R      ||
R   ***************************************************
R   * Press then release throttle control lever No.4  *
R   * instinctive disconnect push-button              *
R   * Check that AT warnings disappear from           *
R   * Captain's and First Officer's W & LD indicators. *
R   * IF                                              *
R   ***************************************************
R      ||    |               ----------------------------------------
R      ||    |               | No cancellation of AT warning following |
R      OK    |-NOT OK--| operation of throttle control lever        |
R      ||                    | No.4 instinctive disconnect push-button |
R      ||                    | Ref. Chart 111.                         |
R      ||                    ----------------------------------------
R   ***************************************************
R   * Align the four throttle control levers in flight *
R   * idle position. Engage AT1 (AT2) switch. Place   *
R   * throttle control lever No.1 (No.2 for AT2) in   *
R   * reverse position.                               *
R   * Check that AT1 (AT2) switch disengages. IF      *
R   ***************************************************
R      ||    |               ----------------------------------------
R      OK    |-NOT OK--| No disengagement of AT system in reverse |
R      ||                    | Ref. Chart 112.                         |
R      ||                    ----------------------------------------
R   ***************************************************
R   * Re-align the four throttle control levers       *
R   * in flight idle position.                        *
R   * Engage AT1 (AT2) switch.                        *
R   * Place throttle control lever No.3 (No.4 for AT2) *
R   * in reverse position.                            *
R   * Check that AT1 (AT2) switch disengages. IF      *
R   ***************************************************
R      ||    |               ----------------------------------------
R      OK    |-NOT OK--| No disengagement of AT system in reverse. |
R      ||                    | Ref. Chart 112.                         |
R      ||                    ----------------------------------------
R   ***************************************************
R   * Place ADC2 (ADC1) switch in ON position, then   *
R   * reset. Place both switches ANTISTALL SYSTEM 1 and *
R   * 2 in ON position. Engage AUTOSTAB No.1 and No.2 *
R   * PITCH, ROLL, and YAW levers. On Captain's and   *
R   * First Officer's RMIs, check that Compass Coupler *
R   * flag is out-of-view. Engage FD1 (FD2) switch.   *
R   * On AFCS control unit AP/FD section, check that  *
R   * IAS HOLD mode push-button extinguishes as AT    *
R   * section IAS HOLD mode push-button illuminates. IF *
R   ***************************************************
```

```
R     ||   |            ---------------------------------------------
R     ||   |           | In IAS HOLD mode, no incompatibility between |
R     OK   |-NOT OK--| AP/FD and AT systems.                         |
R     ||               | Ref. Chart 113.                              |
R     ||                ---------------------------------------------
R  ************************************************
R  * Select AP/FD IAS HOLD mode.                  *
R  * Check that AT1 (AT2) switch disengages. IF   *
R  ************************************************
R     ||   |            ---------------------------------------------
R     OK   |-NOT OK--| Ref. Chart 113.                              |
R     ||                ---------------------------------------------
R  ************************************************
R  * Disengage FD1 (FD2) switch.                  *
R  * Engage FD2 (FD1) switch. Select AP/FD IAS HOLD *
R  * mode.                                        *
R  * Engage AT1 (AT2) switch.                     *
R  * Check that AP/FD IAS HOLD mode selection push- *
R  * button extinguishes when AT IAS HOLD mode    *
R  * selection push-button illuminates. IF        *
R  ************************************************
R     ||   |            ---------------------------------------------
R     OK   |-NOT OK--| Ref. Chart 113.                              |
R     ||                ---------------------------------------------
R  ************************************************
R  * Select AP/FD IAS HOLD mode.                  *
R  * Check that AT1 (AT2) switch disengages. IF   *
R  ************************************************
R     ||   |            ---------------------------------------------
R     OK   |-NOT OK--| Ref. Chart 113.                              |
R     ||                ---------------------------------------------
R  ************************************************
R  * Select ALT ACQ mode.                         *
R  * Check that AT1 (AT2) switch can be engaged   *
R  * without causing any AT mode selection push-  *
R  * button to illuminate. IF                     *
R  ************************************************
R     ||   |            ---------------------------------------------
R     OK   |-NOT OK--| In ALT ACQ mode, no incompatibility between  |
R     ||               | the AP/FD and AT systems.                    |
R     ||               | Ref. Chart 113.                              |
R     ||                ---------------------------------------------
```

```
R     ||
R  ****************************************************
R  * Disengage FD2 (FD1) switch. Disengage AT1 (AT2)   *
R  * switch. Engage FD1 (FD2) switch.                  *
R  * Select AP/FD IAS HOLD mode, then ALT ACQ mode.    *
R  * Check that AT1 (AT2) switch can be engaged without*
R  * causing any AT mode selection push-button         *
R  * to illuminate. IF                                 *
R  ****************************************************
R     ||    |       ---------------------------------------------
R     OK    |-NOT OK--| Ref. Chart 113.                           |
R     ||            ---------------------------------------------
R  ****************************************************
R  * Disengage FD1 switch.                             *
R  * Disengage PITCH, ROLL, and YAW levers of both     *
R  * control units AUTOSTAB No.1 and AUTOSTAB No.2     *
R  * Place the two switches ANTISTALL SYSTEM 1 and 2   *
R  * in OFF position.                                  *
R  * Connect pressure sensor simulator with            *
R  * test connector on front face of ADC No.1 [10]     *
R  * (ADC No.2 [11]).                                  *
R  * Place ADC1 (ADC2) switch in ON position, then     *
R  * reset.                                            *
R  * By means of simulator AIRSPEED potentiometer,     *
R  * select a speed of 340 Kts on Captain's (First     *
R  * Officer's) airspeed indicator                     *
R  * Align the four throttle control levers            *
R  * in mid-way position.                              *
R  * Engage AT1 (AT2) switch.                          *
R  * Gradually increase speed to 365 Kts.              *
R  * Check that the four throttle control levers       *
R  * are moving towards the flight idle position. IF   *
R  ****************************************************
R     ||    |       ---------------------------------------------
R     ||    |       | No displacement of throttle control levers |
R     OK    |-NOT OK--| on change in IAS data from associated ADC. |
R     ||            | Ref. Chart 114.                            |
R     ||            ---------------------------------------------
```


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```
R      ||
R   ***************************************************
R   * By means of simulator AIRSPEED potentiometer    *
R   * display Mach 1.6 on Captain's (First Officer's) *
R   * machmeter.                                      *
R   * Select MACH HOLD mode and gradually decrease    *
R   * Mach number                                     *
R   * Check that the four throttle control levers     *
R   * are moving towards max. thrust position. IF     *
R   ***************************************************
R      ||    |         ----------------------------------------------
R      ||    |        | No displacement of throttle control levers   |
R      OK    |-NOT OK--| on change in Mach data from associated ADC.  |
R      ||             | Ref. Chart 114.                              |
R      ||              ----------------------------------------------
R   ***************************************************
R   * Place ADC1 (ADC2) switch in OFF position        *
R   * Disconnect simulator from ADC No.1 [10] (ADC No.2 *
R   * [11]).                                          *
R   * Channel 2 of Autothrottle system is serviceable. *
R   * IF                                              *
R   ***************************************************
R      ||    |         ----------------------------------------------
R      ||    |        | Repeat trouble shooting procedure referring  |
R      OK    |-NOT OK--| to information given in brackets to check AT2. |
R      ||              ----------------------------------------------
R   ***************************************************
R   * Place the four throttle control levers in flight *
R   * idle position.                                  *
R   * Engage AT1 switch, then AT2 switch.             *
R   * IAS HOLD mode selection push-button is illuminated*
R   * Operate datum adjust unit AUTOTHROTTLE toggle   *
R   * switch in INCREASE sense ; throttle control levers*
R   * are moving towards max. thrust positions.       *
R   * Hold toggle switch and disengage AT1 switch.    *
R   * AT2 being engaged, check that throttle control  *
R   * levers keep moving in accordance with toggle    *
R   * switch operation. IF                            *
R   ***************************************************
R      ||    |         ----------------------------------------------
R      OK    |-NOT OK--| No change-over signal                        |
R      ||             | Ref. Chart 115.                              |
R      ||              ----------------------------------------------
R   ***************************************************
R   * Disengage AT2 switch.                           *
R   * The Autothrottle system is serviceable.         *
R   ***************************************************
```

```
R   ************************************---------------------------------
R   * NOT POSSIBLE TO ENGAGE AT1 (AT2)   *| GROUND EQUIPMENT REQUIRED     |
R   * SWITCH.                            *|-------------------------------|
R   ************************************| DESCRIPTION        PART NO.  |
R                                        |-------------------------------|
R                                        | MULTIMETER                    |
R                                        ---------------------------------

R   ----------------------------------------------------
R   | Align the four throttle control levers in mid-way |
R   | position.                                         |
R   | Successively place the four AUTOTHROTTLE isolation|
R   | switches in OFF position                          |
R   | Check if each time an isolation switch is in      |
R   | OFF position, AT1 (AT2) switch can be engaged.    |
R   ----------------------------------------------------
R       |    |
R       |    |       -----------------------------------------------------
R      NO    |-YES-----| Replace relevant forward thrust throttle switch|
R       |            | pack [12], [13], [14], or [15].                 |
R       |            -----------------------------------------------------
R   ----------------------------------------------------
R   | By means of the ITEM system TEST UNIT function,   |
R   | check Warning and Landing Display computer No.1   |
R   | (No.2). Data displayed are :                      |
R   ----------------------------------------------------
R       |        |   -----------------------------------------------------
R   WLD PASS WLD COMP-| Replace W & LD computer No.1 [16] (No.2 [17]). |
R       |            -----------------------------------------------------
R       |
R   ----------------------------------------------------
R   | Check if FD1 (FD2) switch engages.                |
R   ----------------------------------------------------
R       |    |       -----------------------------------------------------
R      YES   |-NO------| Ref. 22-10-00, Trouble Shooting relating to     |
R       |            | AP/FD system.                                   |
R       |            -----------------------------------------------------
R       |
R   ----------------------------------------------------
R   | On AFCS control unit AP/FD section, select IAS    |
R   | HOLD mode                                         |
R   | Check if FD1 switch remains engaged.              |
R   ----------------------------------------------------
R       |    |       -----------------------------------------------------
R      YES   |-NO------| Replace Air Data Computer No.1 [10] (No.2 [11])|
R       |            -----------------------------------------------------
```

R Chart 101 (Sheet 1 of 2)

```
     |
---------------------------------------------------------
| For test purposes, replace Autothrottle computer     |
| No.1 (No.2 [2]). Place the four AUTOTHROTTLE          |
| isolation switches in ON position.                    |
| Check if AT1 (AT2) switch engages.                    |
---------------------------------------------------------
     |     |                 -----------------------------------------
    NO     |-YES-----| Replace removed computer by the new one        |
     |                 -----------------------------------------
---------------------------------------------------------
| On ZA, then ZB test connectors of Autothrottle       |
| computer No.1 (No.2), check if voltage between        |
| terminals 61 and 1 is 8.25 VAC :                      |
---------------------------------------------------------
     |     |                 -----------------------------------------
    YES    |-NO------| Check 26 VAC supply from circuit breaker       |
     |               | [18] ([19]).                                   |
     |                 -----------------------------------------
---------------------------------------------------------
| Connect ZA test connector terminals 83 and 40        |
| with ZB connector terminal 83.                        |
| Check if AT1 (AT2) switch engages.                    |
---------------------------------------------------------
     |     |                 -----------------------------------------
    NO     |-YES-----| Replace AP/FD pitch computer No.1 [33], 2 [34].|
     |                 -----------------------------------------
---------------------------------------------------------
| For test purposes, remove Autothrottle computer      |
| No.1 (No.2) from its rack.                            |
| On rack shelf 1C171 BB (2C171 BB) :                   |
| continuity between terminals 11 and 9.                |
---------------------------------------------------------
     |                               |
    YES                              NO
     |                               |
---------------------------------  ---------------------------------
| Fit two reverse select relays | | Replace AFCS control unit [20].|
| [21], [22] ([23]), [24]) :    |---------------------------------
| continuity between terminals  |
| 11 and 9.                     |
---------------------------------  ---------------------------------
     |     |-YES--------------------| Replace relevant reverse select|
    NO                              | relay                          |
     |                               ---------------------------------
---------------------------------
| Check operating condition of  |
| both instinctive disconnect   |
| push-buttons [25] and [26]    |
---------------------------------
```

Chart 101 (Sheet 2 of 2)

```
R   *************************************
R   * NO DISPLACEMENT OF THROTTLE CONTROL*
R   * LEVERS FOLLOWING                   *
R   * DATUM ADJUST UNIT CONTROL          *
R   *************************************


R   ----------------------------------------------------
R   | For test purposes, replace Autothrottle computer |
R   | No.1 [1] (No.2 [2]).                             |
R   | Engage AT1 (AT2) switch                          |
R   | Check if, on operation of datum adjust unit      |
R   | AUTOTHROTTLE toggle switch in INCREASE or        |
R   | in DECREASE senses, the throttle control levers  |
R   | are moving accordingly.                          |
R   ----------------------------------------------------
R       |   |
R       |   |       ------------------------------------------
R      NO   |-YES---| Replace removed computer by the new one. |
R       |           ------------------------------------------
R       |
R   ----------------------------------------------------
R   | Align the four throttle control levers in max.   |
R   | thrust position                                  |
R   | Select IAS ACQ mode.                             |
R   | Check if the four throttle control levers are    |
R   | moving towards the flight idle positions.        |
R   ----------------------------------------------------
R       |   |
R       |   |       ------------------------------------------
R      NO   |-YES---| Replace AFCS datum adjust unit [27].     |
R       |           ------------------------------------------
R       |
R       |           ------------------------------------------
R       |-----------| Replace Autothrottle actuator [28].      |
R                   ------------------------------------------
```

R Chart 102

```
R   ************************************
R   * ANY OF THE FOUR THROTTLE CONTROL   *
R   * LEVERS DOES NOT MOVE FOLLOWING     *
R   * DATUM ADJUST UNIT CONTROL.         *
R   ************************************


R   ----------------------------------------------------------
R   | Place faulty throttle control lever in flight           |
R   | idle position, and the three remaining ones in          |
R   | mid-way position.                                       |
R   | Check if AT1 (AT2) switch engages.                      |
R   ----------------------------------------------------------
R         |     |
R         |     |        --------------------------------------------------
R        NO     |-YES-----| Replace associated AUTOTHROTTLE isolation      |
R         |               | switch [29], [30], [31], [32].                 |
R         |               --------------------------------------------------
R         |
R         |               --------------------------------------------------
R         |---------------| Replace Autothrottle actuator [28].            |
R                         --------------------------------------------------
```

R Chart 103

```
R   *************************************
R   * AT1 (AT2) SWITCH DOES NOT REMAIN  *
R   * ENGAGED ON IAS OR MACH DATA       *
R   * RECEPTION FROM ASSOCIATED ADC.    *
R   *************************************


R   ----------------------------------------------------
R   | For test purposes, replace Autothrottle computer  |
R   | No.1 [1] (No.2 [2])                               |
R   | Check if AT1 (AT2) switch engages in tested mode :|
R   | IAS HOLD or MACH HOLD.                            |
R   ----------------------------------------------------
R        |   |
R        |   |       ---------------------------------------------------
R       NO   |-YES-----| Replace removed computer by the new one.          |
R        |           ---------------------------------------------------
R        |
R        |           ---------------------------------------------------
R        |-------------| Replace Air data computer No.1 [10] (No.2 [11])|
R                    ---------------------------------------------------
```

R Chart 104

AT1 (AT2) SWITCH DISENGAGES ON SELECTION OF IAS ACQ MODE.

Place ANTISTALL SYSTEM 1 (2) switch in ON position
Place ADC1 (ADC2) TEST selector switch in position 1.
Engage AUTOSTAB No.1 (No.2) control unit PITCH lever.
Check if SYST FAIL 1 (2) caption light is illuminated.

- YES — Replace Air data computer No.1 [10] (No.2 [11])
- NO ↓

Replace Autothrottle computer No.1 [1] (No.2 [2]).
ADC1 (ADC2) TEST selector switch is in position 1.
Display a speed of 355 Kts on KNOTS counter.
Engage AT1 (AT2) switch.
Check if switch remains engaged on selection of IAS ACQ mode.

- YES — Replace removed computer by the new one.
- NO ↓

For test purposes, replace Air Data computer No.1 [10] (No.2 [11]).
Repeat check. AT1 (AT2) switch remains engaged.

- YES — Replace removed Air Data computer by the new one.
- NO — Replace AFCS control unit [20].

Chart 105

```
*************************************
* DISENGAGEMENT OF AT1 (AT2) SWITCH  *
* AND/OR NO DISPLACEMENT OF THROTTLE *
* CONTROL LEVERS IN IAS ACQ MODE     *
*************************************
```

```
 ------------------------------------------------------
 | For test purposes replace Autothrottle computer    |
 | No.1 [1] (No.2 [2])                                |
 | Place ADC1 (ADC2) TEST selector switch             |
 | in position 1                                      |
 | Display a speed of 355 Kts on KNOTS counter.       |
 | Engage AT1 (AT2) switch                            |
 | Select IAS ACQ mode.                               |
 | Check if throttle control levers move when the     |
 | speed displayed on counter is varied without       |
 | disengagement of AT1 (AT2) switch.                 |
 ------------------------------------------------------
         |   |
         |   |
         |   |                  --------------------------------------------------
        NO   |-Yes-----| Replace removed computer by the new one.               |
         |                      --------------------------------------------------
         |
         |                      --------------------------------------------------
         |-------------| Replace AFCS control unit [20].                        |
                                --------------------------------------------------
```

Chart 106

```
R   **************************************
R   * DISPLACEMENT OF THROTTLE CONTROL   *
R   * LEVERS NOT INHIBITED WHEN A FLIGHT *
R   * IDLE OR A MAX. THRUST MICROSWITCH  *
R   * IS ENERGIZED.                      *
R   **************************************


R   -----------------------------------------------------
R   | Align the four throttle control levers            |
R   | in mid-way position, then place faulty throttle   |
R   | control lever in flight idle or max. thrust       |
R   | position depending on the fault encountered.      |
R   | Check if AT1 (AT2) switch can be engaged.         |
R   -----------------------------------------------------
R         |   |
R         |   |
R         |   |        ---------------------------------------------------
R      NO     |-YES-----| Replace relevant forward thrust throttle       |
R         |            | switch pack [12], [13], [14], [15].             |
R         |            ---------------------------------------------------
R         |
R         |            ---------------------------------------------------
R         |            | Replace Autothrottle computer No.1 [1]          |
R         |------------| (No.2 [2]).                                     |
R         |            ---------------------------------------------------
```

R Chart 107

```
R   ***************************************
R   * ISOLATION OF THROTTLE CONTROL       *
R   * LEVERS INOPERATIVE.                 *
R   ***************************************


R   ----------------------------------------------------
R   | Align the four throttle control levers in mid-way |
R   | position.                                         |
R   | Place faulty throttle control lever in flight     |
R   | idle position and its associated isolation switch |
R   | in OFF position.                                  |
R   | Check if AT1 (AT2) switch can be engaged.         |
R   ----------------------------------------------------
R          |   |
R          |   |      ---------------------------------------------------
R       NO     |-YES-----| Replace Autothrottle actuator [28].            |
R          |              ---------------------------------------------------
R          |
R          |
R          |              ---------------------------------------------------
R          |-------------| Replace associated AUTOTHROTTLE isolation        |
R                        | switch [29], [30], [31], or [32].                |
R                         ---------------------------------------------------
```

R Chart 108

```
*************************************
* THROTTLE CONTROL LEVER            *
* POSITION FEEDBACK NOT CORRECT.    *
*************************************
```

```
----------------------------------------------------
| For test purposes, replace AUTOTHROTTLE computer |
| No.1 [1] (No.2 [2]).                             |
| Align the four throttle control levers in mid-way|
| position.                                        |
| Engage AT1 (AT2) switch.                         |
| Successively place each throttle control lever   |
| forward or rearward of the three others.         |
| Check if the three other throttle control levers |
| are moving in the opposite sense to the first one.|
----------------------------------------------------
    |   |
    |   |      ------------------------------------------------
   NO   |-YES-----| Replace removed computer by the new one.   |
    |              ------------------------------------------------
    |
    |              ------------------------------------------------
    |-------------| Replace Autothrottle actuator [28].         |
                   ------------------------------------------------
```

Chart 109

```
R   ************************************
R   * THROTTLE CONTROL LEVER No.1 AT    *
R   * INSTINCTIVE DISCONNECT PUSH-BUTTON *
R   * INOPERATIVE                       *
R   ************************************


R   ------------------------------------------------------
R   | Press then release throttle control lever No.4     |
R   | AT instinctive push-button                         |
R   | Check if AT1 (AT2) switch disengages.              |
R   ------------------------------------------------------
R         |   |
R         |   |            ------------------------------------------------
R        NO   |-YES-----| Replace throttle control lever No.1 instinctive|
R         |             | disconnect push-button [25].                   |
R         |             ------------------------------------------------
R         |
R         |             ------------------------------------------------
R         |             | Replace Autothrottle computer No.1 [1]         |
R         |-------------| (No.2 [2]).                                    |
R                       ------------------------------------------------
```

R Chart 110

```
R   **************************************
R   * NO CANCELLATION OF AT WARNING      *
R   * FOLLOWING OPERATION OF THROTTLE    *
R   * CONTROL LEVER NO.4                 *
R   * INSTINCTIVE DISCONNECT PUSH-BUTTON *
R   **************************************


R   ----------------------------------------------------
R   | Press then release throttle control lever No.1   |
R   | instinctive disconnect push-button.              |
R   | Check if AT warning disappears from both         |
R   | Captain's and First Officer's W & LD indicators. |
R   ----------------------------------------------------
R        |   |
R        |   |     --------------------------------------------------
R       NO   |-YES-----| Replace throttle control lever No.4         |
R        |             | instinctive disconnect push-button [26].    |
R        |             --------------------------------------------------
R        |
R        |             --------------------------------------------------
R        |             | Replace faulty W & LD computer (No.1 [16], or |
R        |             | No.2 [17], depending on the side of AT        |
R        |-------------| warning light which remains illuminated.     |
R                      --------------------------------------------------
```

R Chart 111

R ************************************
R * NO DISENGAGEMENT OF AT SYSTEM *
R * IN REVERSE *
R ************************************

R For test purposes, replace the relay ([21], [22], [23], or [24] associated with the throttle control lever placed in reverse position

R YES → Replace removed relay by the new one.

R NO → Ref. Bucket control system Trouble Shooting, 71-00-51

R Chart 112

```
R   ***************************************
R   * IN IAS HOLD MODE OR ALT ACQ MODE,   *
R   * NO INCOMPATIBILITY BETWEEN          *
R   * AP/FD AND AT SYSTEMS                *
R   ***************************************


R   -----------------------------------------------------
R   | For test purposes, replace Autothrottle computer  |
R   | No.1 [1] (No.2 [2]).                              |
R   | Repeat check of incompatilibity between AP/FD     |
R   | and AT systems in selected mode.                  |
R   | Check if there is incompatibility.                |
R   -----------------------------------------------------
R       |   |
R       |   |        ---------------------------------------------------
R      NO   |-YES-----| Replace removed computer by the new one.        |
R       |            ---------------------------------------------------
R       |
R       |            ---------------------------------------------------
R       |            | Ref. to AP/FD system Trouble Shooting           |
R       |-------------| Ref. 22-10-00.                                  |
R                    ---------------------------------------------------
```

R Chart 113

```
R   *************************************-------------------------------
R   * NO DISPLACEMENT OF THROTTLE       *| GROUND EQUIPMENT REQUIRED   |
R   * CONTROL LEVERS FOLLOWING          *|-----------------------------|
R   * CHANGE IN IAS OR MACH DATA        *| DESCRIPTION        PART NO. |
R   * FROM ASSOCIATED ADC.              *|-----------------------------|
R   *************************************| SIMULATOR                   |
R                                        | PRESSURE SENSORS  87209455  |
R                                        -------------------------------

R   --------------------------------------------------------
R   | For test purposes, replace Autothrottle computer     |
R   | No.1 [1] (No.2 [2]).                                 |
R   | By means of pressure sensor simulator, repeat        |
R   | procedure in the mode considered (IAS HOLD or        |
R   | MACH HOLD)                                           |
R   | Check if throttle control levers move towards        |
R   | flight idle position for an increasing Ias or        |
R   | towards max. thrust position for a decreasing        |
R   | Mach number.                                         |
R   --------------------------------------------------------
R        |   |
R        |   |          ---------------------------------------------------
R      NO    |-YES-----| Replace removed computer by the new one.          |
R        |              ---------------------------------------------------
R        |
R        |              ---------------------------------------------------
R        |-------------| Replace Air Data computer No.1 [10] (No.2 [11])|
R                       ---------------------------------------------------
```

R Chart 114

```
*************************************
* NO CHANGE-OVER SIGNAL.            *
*************************************



-----------------------------------------------------
| For test purposes, replace Autothrottle computer  |
| No.1 [1]                                          |
| Re-engage both levers AT1 and AT2.                |
| Check if throttle control levers move             |
| in accordance with AUTOTHROTTLE toggle switch     |
| operation, AT1 and AT2 being engaged, then AT2    |
| only being engaged.                               |
-----------------------------------------------------
     |   |
     |   |             --------------------------------------------------
    NO   |-YES-----| Replace removed computer by the new one.           |
     |                 --------------------------------------------------
     |                 --------------------------------------------------
     |-------------| Replace Autothrottle computer No.2 [2]             |
                       --------------------------------------------------
```

Chart 115

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	WIRING DIAGRAM
[1] Auto-throttle computer No.1	123BS	4-215	1C171	Electronics rack-LH	22-31-11 R/I	22-31-02 22-31-03 22-31-04 22-31-05
[2] Auto-throttle computer No.2	216BS	4-216	2C171	Electronics rack-RH	22-31-11 R/I	22-31-06 22-31-07 22-31-08 22-31-09
[3] Circuit breaker 115 VAC		13-215	1C179	Map Ref. C.6	24-50-00 R/I	22-31-01
[4] Circuit breaker 115 VAC		13-216	2C179	Map Ref. D.16	24-50-00 R/I	22-31-01
[5] Circuit breaker 28 VDC		1-213	1C180	Map Ref. Q.12	24-50-00 R/I	22-31-01
[6] Circuit breaker 28 VDC		5-213	2C180	Map Ref. A.14	24-50-00 R/I	22-31-01
[7] Longitudinal accelerometer No.1	123AB	123	1C183	FWD-underfloor racking	22-31-62 R/I	22-31-03
[8] Longitudinal accelerometer No.2	123AB	123	2C183	FWD-underfloor racking	22-31-62 R/I	22-31-07
[9] Circuit breaker 28 VDC		1-213	W513	Map Ref. P.15	24-50-00 R/I	
[10] Air data computer No.1	215ES	6-215	1F71	Electronics rack-	34-00-00 R/I	22-31-03
[11] Air data computer No.2	216ES	6-216	2F71	Electronics rack-RH	34-00-00 R/I	22-31-07
[12] Forward thrust throttle switch pack Engine No.1	211CS	9-211	1K1548	Centre console	76-15-12 R/I	22-31-02 22-31-06

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	MANUAL REF. WIRING DIAGRAM
[13] Forward thrust throttle switch pack Engine No.2	211CS	9-211	2K1548	Centre console	76-15-12 R/I	22-31-02 22-31-06
[14] Forward thrust throttle switch pack Engine No.3	212CS	9-211	3K1548	Centre console	76-15-12 R/I	22-31-02 22-31-06
[15] Forward thrust throttle switch pack Engine No.4	212CS	9-211	4K1548	Centre console	76-15-12 R/I	22-31-02 22-31-06
[16] Warning and Landing Display computer No.1	215BS	4-215	1C188	Electro-nics rack-LH	22-41-11 R/I	22-31-04 22-31-08
[17] Warning and Landing Display computer No.2	216BS	4-216	2C188	Electro-nics rack-RH	22-41-11 R/I	22-31-04 22-31-08
[18] Circuit breaker 26 VAC		13-215	1C181	Map Ref. D.5	24-50-00 R/I	22-31-01
[19] Circuit breaker 26 VAC		13-216	2C181	Map Ref. B.17	24-50-00 R/I	22-31-01
[20] AFCS control unit		5-211	C1	Glare-shield instrument panel	22-11-21 R/I	22-31-02 22-31-03 22-41-04 22-31-05 22-31-06 22-31-07 22-31-08 22-31-09
[21] Reverse select relay Engine No.1	123BB	19-123	1E463	Fwd under-floor racking		22-31-02 77-13-01

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	MANUAL REF. WIRING DIAGRAM
[22] Reverse select relay Engine No.2	123BB	19-123	2E463	Fwd under-floor racking		22-31-02 77-13-02
[23] Reverse select relay Engine No.3	123BB	20-123	3E463	Fwd under-floor		22-31-06 77-13-03
[24] Reverse select relay Engine No.4	123BB	20-123	4E463	Fwd under-floor racking		22-31-06 77-13-04
[25] Auto-throttle instinctive disconnect push button(Captain)		9-211	1C182	Throttle lever No.1	22-31-63 R/I	22-31-02 22-31-06
[26] Auto-throttle instinctive disconnect push button (F/O)		9-211	2C182	Trottle lever No.4	22-31-63 R/I	22-31-02 22-31-06
[27] AFCS datum adjust unit		7-211	C2	Centre console	22-11-11 R/I	22-31-03 22-31-07
[28] Auto-throttle actuator	211JS 212JS	9-211	C172	Centre console	22-31-61	22-31-02 22-31-03 22-31-06 22-31-07
[29] AUTO-THROTTLE isolation switch Throttle lever		4-211	C175	Ceiling panel		22-31-02 22-31-06
[30] AUTO-THROTTLE isolation switch Throttle lever		4-211	C176	Ceiling panel		22-31-02 22-31-06

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	MANUAL REF. WIRING DIAGRAM
[31] AUTO-THROTTLE isolation switch Throttle lever		4-211	C177	Ceiling panel		22-31-02 22-31-06
[32] AUTO-THROTTLE isolation switch Throttle lever		4-211	C178	Ceiling panel		22-31-02 22-31-06
[33] AP/FD Pitch computer No.1	215BS	4-215	1C12	Electronics rack-LH	22-12-11 R/I	22-31-03
[34] AP/FD Pitch computer No.2	216BS	4-216	2C12	Electronics rack-RH	22-12-11 R/I	22-31-07

Component Identification
Table 101

AUTOTHROTTLE - ADJUSTMENT/TEST

1. General

CAUTION : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 24-00-00, SERVICING.

The following adjustment/test procedures are intended to provide a correct operation of the Autothrottle (AT) system.
The purpose of this system is to control accurately the aircraft speed by setting automatically the throttle control levers within the various flight phases.
This procedure is carried out on the ground, shock absorbers compressed.

2. Operational Test

This operational test includes the following :

- Check of computers and accelerometers by means of the ITEM system
- Check of throttle control lever displacement
- Check of AT instinctive disconnect circuit and of warnings.

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.470 m (14 ft.8 in.)	
Electrical Ground Power Unit	

B. Prepare

(1) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG 2	1-213	2E 461	E 3
ENG 3		3E 461	E 4
NOSE UC WEIGHT SW "A" SUP		G 291	M16
LH UC WEIGHT SW "A" SUP		G 292	M17
ADC1 28V SUP		1F 74	P12
WARN & LDG DISPLAY SUP1		1C 192	P13
WARN & LDG DISPLAY SUP2		1C 193	P14

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AT1 CONT		1C 180	Q12
AP/FD SYS 1 CONT		1C 17	Q13
AFCS1 CONT		1C 19	Q14
AFCS TEST1 115V SUP		1C 383	R12
ADC1 26 V SUP	2-213	1F 78	A 2
1ST PLT INST SUP		1F 75	B 5
AP/FD SYS 1 SUP		1C 20	C 5
ADC1 115V SUP		1F 73	F 3
LDG DISPLAY SYS1 SUP		1C 191	F 4
RH UC WEIGHT SW "B" SUP	3-213	G 294	B 9
NOSE/UC WEIGHT SW "B" SUP		G 296	D 8
AP/FD SYS2 CONT	5-213	2C 17	A11
AFCS2 CONT		2C 19	A12
AT2 CONT		2C 180	A14
WARN & LDG DISPLAY 2 SUP1		2C 192	B11
WARN & LDG DISPLAY 2 SUP2		2C 193	B12
ENG 1		1E 461	D 1
ENG 4		4E 461	D 2
AFCS TEST 2 28 V SUP		2C 383	F11
ADC 2 28 V SUP		2F 74	F12
AP/FD COMP1 SUP	13-215	1C 18	A 5
AT SYS 1 SUP		1C 179	C 6
AFCS MODE SYS1 SUP		1C 273	B 5
AT SYNCHRO SYS1 SUP		1C 181	D 5
AFCS TEST1 115V SUP		1C 384	D 6
2ND PLT INST SUP	13-216	2F 75	A14
AP/FD SYS 2 SUP		2C 20	A17
AT SYNCHRO SYS 2 SUP		2C 181	B17
AT SYS 2 SUP		2C 179	D16
AFCS MODE SYS 2 SUP		2C 273	E17
ADC 2 26 V SUP		2F 78	F14
ADC2 115 V SUP		2F 73	F15
LDG DISPLAY SYS 2 SUP		2C 191	F16
AFCS TEST 2 115 V SUP		2C 384	F17
AP/FD COMP 2 SUP		2C 18	F18
PLTS LT TEST SUP	15-215	L1001	E14

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(2) Set the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-216	X 345	G 4

(3) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(4) At Flight Engineer's station

(a) On EQUIPMENT BAY COOLING panel ; make certain that the electronics rack ventilation is in operation (Ref. 21-21-00)

(b) Energize INS No. 1 and INS No. 2 by placing associated MSU selector switches in align position (Ref. 34-45-00, Adjustment/Test, Operational Test).

(5) In flight compartment :

(a) On ADC control panel, make certain that TEST selector switches are in NORM position.

(a1) Place ADC1 and ADC2 switches in ON position.

(a2) If ADC1 and ADC2 caption lights illuminate, reset by pressing caption lights, which must extinguish.

(b) On Captain's instrument panel, place ATT-INS1/INS3 switch in INS1 position.

(c) On First Officer's instrument panel, place ATT-INS3/INS2 switch in INS2 position.

(d) On centre instrument panel 6-211, place AFCS MODES selector switch in BRIGHT position.

(e) On both sides of AFCS control unit, place both RAD/INS switches in INS position.

(f) On ceiling panel, make certain that the four AUTOTHROTTLE isolation switches are in ON position.

(g) On LH and RH consoles

(g1) Place D/B LIGHTS TEST switch in TEST position.

(g2) Check that MACH HOLD, IAS HOLD, and IAS ACQ mode selection push-buttons illuminate (only one lamp illuminates in these push-buttons at each check). Check that Captain's and First Officer's airspeed indicators speed discrepancy lights are correct.

(g3) Release D/B LIGHTS TEST switch, which returns to HI position.

(h) On centre console, place the four throttle control levers in idle position.

C. Check of Computers and Accelerometers by Means of the ITEM System

(1) At Flight Engineer's station, on ITEM Control and Indicator Panel.

(a) Place both IFM-OFF-TEST selector switches in TEST position.

NOTE : These two switches are of the pull-to-unlock type.

(b) Place FLIGHT-TEST ALL-TEST UNIT selector switch in TEST UNIT position.

(b1) Check that ITEM and TEST indications appear respectively in windows 3 and 4, side 1, and in windows 7 and 8, side 2.

(b2) Approximately two minutes 30 seconds later, check that PASS indication replaces TEST indication on completion of self-test and of initialization of circuits.

NOTE : If FAIL indication appears during that period instead of TEST indication, this means that one or both ITEM computer(s) is (are) faulty.

(c) Place and hold side 1 SELECT/START selector switch in SELECT position.

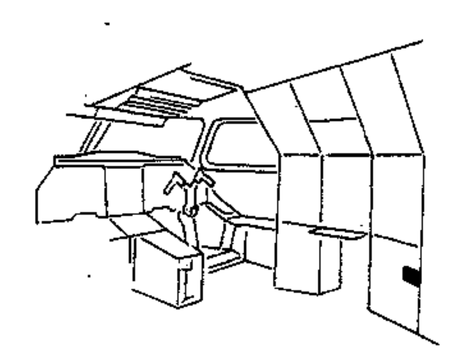
(d) Display AT (autothrottle) indication in window 3 to replace ITEM indication.

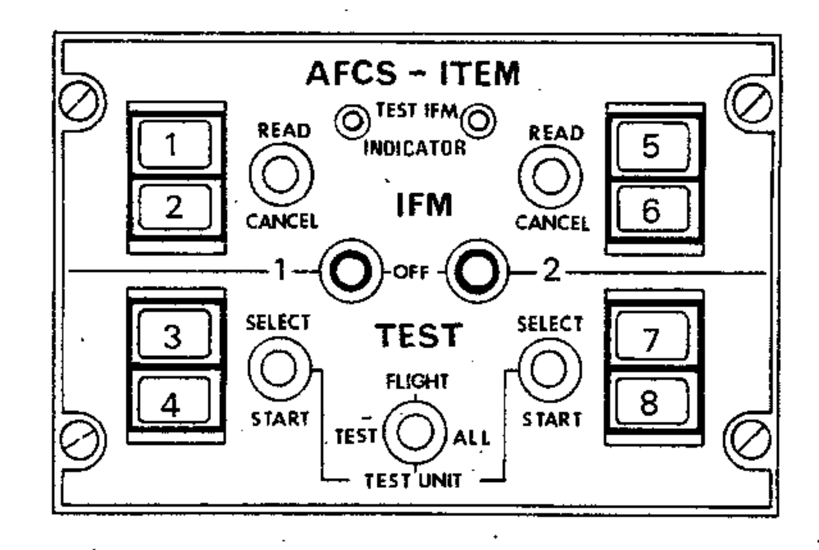
NOTE : The indications concerning the AFCS systems appear cyclically in the following sequence : SFC, AP.P, AP.A, AT, AS.P, AS.R, AS.Y, ET, WLD on window 3 or 7, depending on the side chosen.

(e) On AT indication display, release SELECT/START selector switch (selector switch returns to middle position through a mechanical return device).

(f) Place SELECT/START selector switch in START position, then release.

(f1) Check that AT indication remains displayed in window 3 (7).





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ITEM Control/Indicator Panel
Figure 501

(f2) Check that TEST indication is displayed in window 4 (8).

(f3) Check that PASS indication replaces TEST indication in window 4 (8), after one minute approximately.

NOTE : PASS indication means that lane 1 computer is healthy. If COMP or ACCL indication appears instead of PASS, this means that either the computer or the accelerometer is defective.

(g) Place side 1 IFM-OFF-TEST selector switch in OFF position.

(g1) Check that AT and PASS indications have disappeared from windows 3 and 4.

(h) Repeat the operations described from paragraph 2. C. (1) (c) through 2. C. (1) (f) (f3) to check lane 2. AT and TEST followed by PASS for lane 2 computer will appear in windows 7 and 8 respectively.

R (i) Place side 2 IFM-OFF-TEST selector switch in OFF position.

R (i1) Check that AT and PASS indications have disappeared from windows 7 and 8.

R (j) Place FLIGHT-TEST ALL-TEST UNIT selector switch in FLIGHT position.

D. Check of Throttle Control Lever Displacement

(1) On centre console, align the four throttle control levers in mid-way position.

NOTE : After each engagement, the throttle control levers may drift slightly if aircraft attitude is not level.
To counterbalance drift, act on AUTOTHROTTLE switch of datum adjust unit located on the centre console.

(2) On AFCS control unit, engage AT2 switch.

(a) Switch must remain engaged.

(b) IAS HOLD push-button must illuminate.

(3) On centre console, operate the datum adjust unit AUTOTHROTTLE switch in INCREASE direction (thrust increase).

(a) Check that the throttle levers move in line towards maximum thrust position.

(b) Release switch, which must return to mid-way position.

(4) Operate datum adjust unit AUTOTHROTTLE switch in DECREASE direction (thrust decrease).

(a) Check that throttle levers move in line towards idle position.

(b) Release switch, which must return to mid-way position.

(5) On AFCS control unit, engage AT1 switch.

(a) Switch must remain engaged.

(6) On centre console, repeat operations described from 2. D. (3) through 2. D. (4) (b). Results must be identical.

E. Check of AT Instinctive Disconnect Circuit and of Warnings

(1) On AFCS control unit, AT1 and AT2 switches are engaged.

(2) On Captain's side, press then release instinctive disconnect push-button on throttle lever No.1.

(a) The two AT1 and AT2 engage switches must return to OFF position.

(b) IAS HOLD push-button must extinguish.

(c) The two red AT warning lights on the two Warning and Landing Display (W and LD) indicators (Captain's and First Officer's) must flash.

(3) On First Officer's side, press then release instinctive disconnect push-button on throttle control lever No.4.

(a) On both Warning and Landing Display indicators, both AT warning lights must extinguish.

(4) Place the four throttle control levers in idle position.

F. Close-Up

(1) Trip, safety and tag the following circuit breakers

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-216	X 345	G 4

(2) On ADC control panel, place ADC 1 and ADC 2 switches in OFF position.

(3) At Flight Engineer's station, de-energize inertial navigation system (Ref. 34-45-00, Adjustment/Test).

(4) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(5) Remove access platform.

3. Functional Test

This test includes the following :

- Check of computers and accelerometers by means of the ITEM system
- Check of IAS HOLD and MACH HOLD mode selection and of datum adjust unit operation
- Check of IAS ACQ mode selection and of speed select indicator
- Check of AT instinctive disconnect circuit
- Check of thrust reverse relays
- Check of Autothrottle isolation switches and of thrust limit switches
- Check of AT and AP/FD incompatibility in speed holding mode.
- Check of override and of position feedback.
- Check of AT1-AT2 automatic change-over

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.470 m (14 ft.8 in.)	
Electrical Ground Power Unit	
Circuit Breaker Safety Clips	

B. Prepare

NOTE : Each test can be carried out independently. However, work preparation is common to all tests.

(1) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG 2	1-213	2E 461	E 3
ENG 3		3E 461	E 4
COMPASS COUPLER SYS1 SW SUP1		1F 134	F14
NOSE UC WEIGHT SW "A" SUP		G 291	M16
LH UC WEIGHT SW "A" SUP		G 292	M17
ADC1 28V SUP		1F 74	P12
WARN & LDG DISPLAY SUP1		1C 192	P13
WARN & LDG DISPLAY SUP2		1C 193	P14
AT1 CONT		1C 180	Q12

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AP/FD SYS 1 CONT		1C 17	Q13
AFCS1 CONT		1C 19	Q14
AFCS TEST1 115V SUP		1C 383	R12
ADC1 26 V SUP	2-213	1F 78	A 2
LAT ACCELMTR1 26V SUP		1C 42	B 4
1ST PLT INST SUP		1F 75	B 5
AP/FD SYS 1 SUP		1C 20	C 5
AUTOSTAB 1 COMP		1C 37	E 5
ADC1 115V SUP		1F 73	F 3
LDG DISPLAY SYS1 SUP		1C 191	F 4
COMPASS COUPLER 1 SUP		1F 130	F 8
RH UC WEIGHT SW "B" SUP	3-213	G 294	B 9
NOSE/UC WEIGHT SW "B" SUP		G 296	D 8
AP/FD SYS2 CONT	5-213	2C 17	A11
AFCS2 CONT		2C 19	A12
AT2 CONT		2C 180	A14
WARN & LDG DISPLAY 2 SUP1		2C 192	B11
WARN & LDG DISPLAY 2 SUP2		2C 193	B12
ENG 1		1E 461	D 1
ENG 4		4E 461	D 2
AFCS TEST 2 28 V SUP		2C 383	F11
ADC 2 28 V SUP		2F 74	F12
AP/FD COMP1 SUP	13-215	1C 18	A 5
AFCS MODE SYS1 SUP		1C 273	B 5
COMPASS COUPLER 2 STBY SUP		2F 131	B 7
AT SYS 1 SUP		1C 179	C 6
AT SYNCHRO SYS1 SUP		1C 181	D 5
AFCS TEST1 115V SUP		1C 384	D 6
2nd PLT INST SUP	13-216	2F 75	A14
AP/FD SYS 2 SUP		2C 20	A17
LAT ACCELMTR 2 26 V SUP		2C 47	B16
AT SYNCHRO SYS 2 SUP		2C 181	B17
COMPASS COUPLER 2 NORM SUP		2F 130	D15
AT SYS 2 SUP		2C 179	D16
AUTOSTAB 2 COMP SUP		2C 37	D17
AFCS MODE SYS 2 SUP		2C 273	E17

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ADC 2 26 V SUP		2F 78	F14
ADC2 115 V SUP		2F 73	F15
LDG DISPLAY SYS 2 SUP		2C 191	F16
AFCS TEST 2 115 V SUP		2C 384	F17
AP/FD COMP 2 SUP		2C 18	F18
PLTS LT TEST SUP	15-215	L1001	E14
COMPASS COUPLER SYS 2 SW SUP	15-216	2F 134	A21

(2) Set the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-216	X 345	G 4

(3) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(4) At Flight Engineer's station,

(a) On EQUIPMENT BAY COOLING panel, make certain that electronics rack ventilation is in operation (Ref. 21-21-00).

R (b) Energize INS No. 1 and INS No. 2 by placing
R associated MSU selector switches in ALIGN
R position (Ref. 34-45-00, Adjustment/Test, Opera-
R tional Test).

(5) Make certain that both FD channels can be engaged (Ref. 22-10-00, Servicing, paragraphs 3 and 5).

(6) In flight compartment

(a) On ADC control panel, make certain that ADC1 and ADC2 switches are in OFF position and that associated TEST selector switches are in NORM position.

(b) On Captain's instrument panel place ATT INS1/INS3 switch in INS1 position.

(b1) Make certain that HDG flag has disappeared from HSI indicator.

(c) On First Officer's instrument panel place ATT INS3/INS2 switch in INS2 position.

(c1) Make certain that HDG flag has disappeared from HSI indicator.

(d) On centre instrument panel 6-211, place AFCS-MODES switch in BRIGHT position.

(e) On both sides of AFCS control unit, place RAD/INS switches in INS position.

(f) On ceiling panel, make certain that the four AUTOTHROTTLE isolation switches are in ON position.

(g) On LH side console, then on RH side console place D/B LIGHTS TEST switch in TEST position.

(g1) Check that MACH HOLD, IAS HOLD, and IAS ACQ mode selection push-buttons illuminate (only one lamp illuminates in these push-buttons at each check). Check that Captain's and First Officer's airspeed indicator speed discrepancy indicator lights are correct.

(g2) Release switch which returns to HI position.

(h) On centre console, place the four throttle control levers in idle position.

C. Check of Computers and Accelerometers by Means of the ITEM System

(1) Carry out check as described in Operational Test, paragraph 2. C. (1).

D. Check of IAS HOLD and MACH HOLD Mode Selection and of Datum Adjust Unit

(1) On centre console, align the four throttle control levers in mid-way position.

NOTE : After each engagement, the throttle control levers may drift slightly if the aircraft attitude is not level.
To counterbalance the drift, act on AUTOTHROTTLE switch on datum adjust unit located on the centre console.

(2) On ADC control panel, place ADC1 switch in ON position.

(a) Place ADC1 TEST selector switch in position 2.

(b) Wait approximately one minute :
Machmeter must display Mach 2 and airspeed indicator must display 555 Kts approximately on Captain's instrument panel.

(c) Press amber ADC1 caption light to reset : caption light must extinguish.

NOTE : Visual and aural warnings resulting from TEST function of both ADCs shall be disregarded.

(3) On AFCS control unit, engage AT1 switch.

(a) Switch must remain engaged.

(b) IAS HOLD push-button must illuminate.

(4) On centre console, operate AFCS datum adjust unit AUTOTHROTTLE switch in INCREASE direction (thrust increase).

(a) Check that throttle control levers move in line towards maximum thrust position.

(b) Release switch, which must return to mid-way position.

(5) Operate AFCS datum adjust unit AUTOTHROTTLE switch in DECREASE direction (thrust decrease).

(a) Check that throttle levers move in line towards idle position.

(b) Release switch which must return to mid-way position.

(6) On AFCS control unit, select MACH HOLD mode by pressing MACH HOLD push-button.

(a) MACH HOLD push-button must illuminate.

(b) IAS HOLD push-button must extinguish.

(7) On centre console, on AFCS datum adjust unit, repeat operations described for MACH HOLD mode from paragraph 3.D. (4) through 3. D. (5) (b) for IAS HOLD mode. Results must be identical.

(8) On AFCS control unit, disengage AT1 switch.

(9) On ADC control panel, place ADC1 TEST selector switch in NORM position, then place ADC1 switch in OFF position.

(10) Place ADC2 switch in ON position.

(a) Place ADC2 TEST selector switch in position 2.

(b) Wait approximately one minute :
Machmeter must display Mach 2 and airspeed indicator must display 555 Kts approximately on First Officer's instrument panel.

(c) Reset by pressing ADC amber caption light which must extinguish.

(11) On AFCS control unit, engage AT2 switch and disengage AT1 switch.

(a) Switch must remain engaged.

(b) IAS HOLD push-button must illuminate.

(12) On centre console, carry out operations described from paragraph 3. D. (4) through paragraph 3. D. (7). Results must be identical.

(13) On AFCS control unit, disengage AT2 switch.

(a) MACH HOLD push-button must extinguish.

(b) On both Warning and Landing Display indicators, red AT warning lights must flash.

(14) Press either AT warning light in order to cancel warning.

(15) On ADC control panel, place ADC2 TEST selector switch in NORM position then place ADC2 switch in OFF position

E. Check of IAS ACQ Mode Selection and of Speed Select Indicator

(1) Align the four throttle control levers to mid-way position.

(2) Trip, safety and tag the following circuit breaker :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
STICK SHAKER SUP	1-213	W 513	P15

(3) On ADC control panel place ADC1 switch in OFF position.

(a) Place ADC1 (ADC2) TEST selector switch in position 1.

- Amber ADC1 (ADC2) caption light must illuminate
- 30 seconds later, the corresponding blue TEST caption light illuminates.

(b) Reset by pressing amber ADC1 (ADC2) caption light, which must extinguish.

(c) Check that Captain's airspeed indicator displays approximately 350 kts.

(4) On AFCS control unit, engage AT1 (AT2) switch.

(a) Switch must remain engaged.

(b) IAS HOLD push-button must illuminate.

(5) Display the speed indicated on the airspeed indicator (approximately 350 kts) by means of the SPEED SELECT selection knob.

(6) Press IAS ACQ push-button.

(a) This push-button must illuminate.

(b) IAS HOLD push-button must extinguish.

(c) KNOTS counter bar must disappear.

(7) By means of SPEED SELECT knob, gradually increase selected speed to approximately 370 knots.

(a) On centre console, the four throttle levers must move towards maximum thrust position.

(b) The Captain's and the First Officer's airspeed indicator speed discrepancy indicator lights must illuminate when the discrepancy between the selected speed and the speed read on the airspeed indicators equals 10 kt ± 2 kt.

(8) By means of SPEED SELECT knob, gradually diminish selected speed to approximately 330 kt.

(a) On centre console, the four throttle control levers must move towards idle position.

(b) Check that the Captain's airspeed indicator speed discrepancy indicator light illuminates when the discrepancy between the selected speed and the speed shown on the airspeed indicator equals 10 Kt ± 2 kt.

(9) Press IAS HOLD push-button.

(a) This push-button must illuminate.

(b) IAS ACQ push-button must extinguish.

(c) KNOTS counter bar must be visible.

(10) On ADC control panel, place ADC1 (ADC2) switch in OFF position, and associated TEST selector switch in NORM position.

(a) On AFCS control unit, AT1 (AT2) switch must return to OFF position.

(11) On either Warning and Landing Display Indicator, press AT warning light in order to cancel flashing red warning light.

(12) Align the four throttle control levers in mid-way position.

(13) On ADC control panel, place ADC2 switch in ON position and repeat operations described from paragraph 3. E. (3) (a) through 3. e. (11) for AT2, referring to information in brackets. Results must be identical.

F. Check of AT Instinctive Disconnect Circuit

(1) On ADC control panel, place ADC1 and ADC2 switches in ON position with the associated TEST selector switches in NORM position.

(a) If ADC1 and ADC2 caption lights illuminate, reset by pressing caption lights, which must extinguish.

(2) Align the four throttle control levers in mid-way position.

(3) On AFCS control unit, engage the two AT1 and AT2 switches.

(a) Both switches must remain engaged.

(b) IAS HOLD push-button must illuminate.

(4) On centre console

(a) On Captain's side, press then release instinctive disconnect push-button on throttle control lever No.1.

(a1) The two AT1 and AT2 switches must fall.

(a2) IAS HOLD push-button must extinguish.

(a3) On (Captain's and First Officer's) Warning and Landing Display indicators, both red AT warning lights must flash.

(b) On First Officer's side, press then release instinctive disconnect push-button on throttle control lever No.4.

(b1) The two AT warning lights must extinguish.

G. Check of Reverse Relay

(1) On ADC control panel, place the two ADC1 and ADC2 switches in ON position, with the two associated TEST selector switches in NORM position.

(a) If ADC1 and ADC2 caption lights illuminate, reset by pressing caption lights, which must extinguish.

(2) On AFCS control unit, engage the two AT1 and AT2 switches.

(a) Both switches must remain engaged.

(b) IAS HOLD push-button must illuminate.

R (b1) Throttle control levers must all align
R at about 36°.

(c) Align the four throttle control levers in idle
R position. Move throttle control levers slowly
R to avoid AT disconnection.

(d) Place throttle control lever No.1 in reverse position.

(d1) On AFCS control unit, AT1 switch must fall.

(e) Place throttle control lever No.1 in idle position.

(f) Place throttle control lever No.2 in reverse position.

(f1) On AFCS control unit, check that AT1 switch cannot be engaged.

(g) Place throttle control lever No.2 in idle position.

(h) Place throttle control lever No.3 in reverse position.

(h1) On AFCS control unit, AT2 switch must fall.

(i) Place throttle control lever No.3 in idle position.

(j) Place throttle control lever No.4 in reverse position.

(j1) On AFCS control unit, check that AT2 switch cannot be engaged.

(k) Cancel AT warning by pressing either instinctive disconnect push-button.

H. Check of Autothrottle Isolation Switches and of Thrust Limit Switches

(1) On ADC control panel, make certain that the two ADC1 and ADC2 switches are in ON position and that associated TEST selector switches are in NORM position.

(2) Flight idle limit.

(a) Align the four throttle control levers in mid-way position.

(b) Push throttle control lever No.1 approximately 3° aft from the three others.

(c) On AFCS control unit, engage AT1 (AT2) switch.

(c1) Switch must remain engaged.

(c2) IAS HOLD push-button must illuminate.

(d) Operate the datum adjust unit AUTOTHROTTLE switch in DECREASE direction.

(d1) The four throttle control levers move towards the low stops in the same respective position and stop when throttle control lever No.1 reaches approximately 37°.

(e) Release AUTOTHROTTLE switch, which must return to mid-way position.

(f) On ceiling panel, place throttle control lever No.1 AUTOTHROTTLE isolation switch in OFF position.

(f1) On centre console, the three other throttle control levers must move 2° to 4° towards idle position.

(g) Operate the datum adjust unit AUTOTHROTTLE switch in INCREASE direction.

(g1) The three throttle control levers must move towards maximum thrust position.

(h) On ceiling panel, place throttle control lever No.1 AUTOTHROTTLE isolation switch in ON position when the three throttle control levers reach 15° approximately.

(h1) On AFCS control unit, AT1 (AT2) switch must fall.

(h2) Release AUTOTHROTTLE switch.

(h3) IAS HOLD push-button must extinguish.

(h4) The two red AT warning lights on both (Captain's and First Officer's) Warning and Landing Display indicators must flash.

(i) Press either instinctive disconnect push-button in order to cancel AT warning.

(j) Align the four throttle control levers in mid-way position, and repeat operations described from 3. H. (2) (b) through 3. H. (2) (i) for throttle control levers 2, 3 and 4, being careful to move the throttle control lever considered 3° backwards from the three other ones before each engaging operation and to operate the associated AUTO-THROTTLE isolation switch. Results must be identical.

(3) Maximum thrust limit

(a) Align the four throttle control levers to approximately 12° position.

(b) Bring throttle control lever No.1 approximately 3° forward of the three others.

(c) On AFCS control unit, engage AT1 (AT2) switch.

(c1) Switch must remain engaged.

(c2) IAS HOLD push-button must illuminate.

(d) Operate datum adjust unit AUTOTHROTTLE switch in INCREASE direction.

(d1) The four throttle control levers move towards maximum thrust position in the same respective positions and stop when throttle control lever No.1 reaches between 2 and 0°.

(e) Release AUTOTHROTTLE toggle switch, which must return to mid-way position.

(f) Disengage AT1 (AT2) switch and cancel warning by pressing either instinctive disconnect push-button

(g) Align the four throttle control levers to 12° position, approximately, then repeat operations described from paragraph 3. H. (3) (b) through paragraph 3. H. (3) (f) for throttle control levers 2, 3, and 4, being careful to set the relevant throttle lever 3° forward of the three others and operating the associated AUTOTHROTTLE isolation switch. Results must be identical.

(h) Repeat the operations described from paragraph 3. H. (2) through paragraph 3. H. (3) (g) for AT lane 2, referring to information in brackets. Results must be identical.

I. Check of AT Incompatibility with AP/FD Speed Hold Mode

(1) On ADC control panel, place the two ADC1 and ADC2 switches in ON position, with the two associated TEST selector switches in NORM position.

(a) If ADC1 and ADC2 caption lights illuminate, reset by pressing caption lights, which must extinguish.

(2) On centre console, align the four throttle control levers in mid-way position.

R (3) On AFCS control unit, engage FD1 (FD2) switch (Ref.
R 22-10-00, Servicing, paragraph 3 (paragraph 5)).

(a) Switch must remain engaged.

(b) PITCH HOLD push-button must illuminate.

(c) Select IAS HOLD mode by pressing associated push-button.

(c1) IAS HOLD push-button must illuminate and PITCH HOLD push-button must extinguish.

R (4) On AFCS control unit, engage AT1 (AT2) switch.

(a) Switch must remain engaged.

(b) On AFCS control unit AP/FD section, IAS HOLD push-button must extinguish and PITCH HOLD push-button must illuminate.

(c) On AFCS control unit AT section, IAS HOLD push-button must illuminate.

R (5) On AFCS control unit AP/FD section, select IAS HOLD mode.

(a) AT1 (AT2) switch must fall.

(b) On AFCS control unit AP/FD section, IAS HOLD push-button must illuminate, and PITCH HOLD push-button must extinguish.

R (6) Cancel AT warning by pressing either instinctive disconnect push-button.

R (7) On AFCS control unit, engage AT2 (AT1) switch.

(a) Switch must remain engaged.

(b) On AFCS control unit AP/FD section, IAS HOLD push-button must extinguish and PITCH HOLD push-button must illuminate.

(c) On AFCS control unit AT section, IAS HOLD push-button must illuminate.

R (8) On AFCS control unit AP/FD section, select IAS HOLD mode.

(a) AT2 (AT1) switch must fall.

(b) On AFCS control unit AP/FD section, IAS HOLD push-button must illuminate and PITCH HOLD push-button must extinguish.

R (9) Cancel AT warning by pressing either instinctive disconnect push-button.

R (10) On AFCS control unit, select MAX CLIMB mode.

R (a) MAX CLIMB push-button must illuminate and IAS
R HOLD push-button must extinguish.

R (11) On AFCS control unit, engage AT1(AT2) switch.

R (a) Switch must remain engaged.

R (b) No autothrottle mode push-button (IAS HOLD,
R MACH HOLD, IAS ACQ) must illuminate.

R (12) Select PITCH HOLD mode.

R (a) PITCH HOLD push-button must illuminate and MAX
R CLIMB push-button must extinguish.

R (b) On AFCS control unit AT section, IAS HOLD push-
R button must illuminate.

R (13) On AFCS control unit, disengage AT1(AT2) and FD1(FD2)
R switches (Ref. 22-10-00, Servicing).

R (14) Repeat operations described from paragraph 3. I. (3)
R through 3. I. (13), referring to information in
R brackets. Results must be identical.

R (15) On master warning panel, press STAB warning light in order to cancel warning resulting from disengagement
R of three AUTO STAB No.2 control unit switches.

J. Check of Override and of Position Feedback

(1) On ADC control panel, place the two ADC1 and ADC2 switches in ON position, with the two associated TEST selector switches in NORM position.

(a) If ADC1 and ADC2 warning light illuminate, reset by pressing caption lights, which must extinguish.

(2) On centre console, align the four throttle control levers in mid-way position.

(3) On AFCS control unit, engage AT1 (AT2) switch.

(a) Switch must remain engaged.

(b) IAS HOLD push-button must illuminate.

(4) On centre console, move throttle control lever No.1 manually towards idle position ; proceed slowly enough to avoid AT1 (AT2) engage switch return to OFF position.

(a) The three other throttle control levers must move slightly in the opposite direction.

(b) Bring throttle control lever No.1 back to the level of the three other throttle control levers ; proceed as previously indicated in order to avoid AT1 engage switch falling in OFF position.

(c) Repeat operations described from paragraph 3. J. (4) through paragraph 3. J. (4) (b) with throttle control levers 2, 3 and 4. Results must be identical.

(d) Set the four throttle control levers to mid-way position.

(e) Simultaneously and quickly bring the four throttle control levers to idle position.

(e1) On AFCS control unit, AT1 switch must fall.

(e2) IAS HOLD push-button must extinguish.

(5) Cancel AT warning by pressing either instinctive disconnect push-button.

(5) On centre console, align the four throttle control levers in mid-way position and repeat operations des-

cribed from paragraph 3. J. (3) through paragraph 3. J. (5) for AT2, referring to information in brackets. Results must be identical.

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K. Check of AT1 - AT2 Switching

NOTE : If system test (Ref. Paragraph 4) is carried out after functional test, this check (which includes AT disconnection after de-energization of INS) shall be carried out at end of system test, after paragraph 4.D.

(1) On ADC control panel, place the two ADC 1 and ADC 2 switches in ON position, with the two associated TEST selector switches in NORM position.

(a) If ADC1 and ADC2 caption lights illuminate, reset by pressing caption lights, which must extinguish.

(2) Align the four throttle control levers in idle positions.

(3) On AFCS control unit, engage AT1 and AT2 switches.

(a) Both switches must remain engaged.

(b) IAS HOLD push-button must illuminate.

R (c) Throttle control levers must all align at about
R 36°.

(4) Operate datum adjust unit AUTOTHROTTLE switch in INCREASE direction.

(a) The four throttle control levers move in-line towards maximum thrust position.

(5) While operating AUTOTHROTTLE switch in INCREASE direction, disengage AT1 switch.

(a) The four throttle control levers must keep moving towards the maximum thrust positions.

(6) Release AUTOTHROTTLE switch, which must return to midway position.

R (a) The four throttle control levers must continue
R to move towards full thrust limit.

(7) On AFCS control unit, engage AT1 switch.

(a) Both switches must remain engaged.

(8) At Flight Engineer's station, de-energize Inertial Navigation System No.1 by placing associated MSU se-

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lector switch in OFF position.

(a) AT1 switch must fall.

(9) At Flight Engineer's station, de-energize Inertial Navigation System No.2 by placing associated MSU selector switch in OFF position.

(a) AT2 switch must fall.

(10) Cancel AT warning by pressing either instinctive disconnect push-button.

(11) Place the four throttle control levers in idle position.

L. Close-Up

(1) On ADC control panel, place ADC1 and ADC2 switches in OFF position.

(2) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	3-213	X 355	H 2
NAV INS BUS 13XS	13-216	X 345	G 4

(3) Remove safety clip and tag, and reset the following circuit breaker :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
STICK SHAKER SUP	1-213	W 513	P15

(4) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(5) Remove access platform.

R **ON A/C 006-007,

4. System Test

As well as the functional test, this test includes the following checks :
- Check of AT disconnection coused by Inertial Signal Comparator Unit (ISCU) (Ref. 34-46-00, Adjustment/Test, Functional Test, paragraph 3.C. (7)).
- Check of automatic throttle reduction at 15 feet in automatic landing (Ref. 22-10-00, Adjustment/Test, Functional Test, paragraph 3.X).
- Check of altitude acquisition phase (To be issued later in topic 22-10-00, Adjustment/Test, System Test).
- Check of mode selection and gains.
- Check of longitudinal accelerometers.

4. System Test

As well as the functional test, this test includes the following checks :
- Check of automatic throttle reduction at 15 feet in automatic landing (Ref. 22-10-00, Adjustment/Test, Functional Test, paragraph 3.X).
- Check of altitude acquisition phase (To be issued later in Topic 22-10-00, Adjustment/Test, System Test).
- Check of mode selection and gains.
- Check of longitudinal accelerometers.

A. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	
Simulator - Pressure Sensors	87209455
Multimeter	

B. Prepare

(1) Carry out work preparation for functional test (Ref. Paragraph 3.B).

(2) Remove access panels 215ES and 216ES from shelves 6-215 and 6-216, then connect a pressure sensor simulator to test connector on front panel of each air data computer (ADC), 1F71 and 2F71.

(a) Switches and potentiometers must be in following configuration :

SENSOR - SIMUL	on SENSOR
I LOCAL - I = 1°, I = 0.24°	on I LOCAL
PROBE CORRECTION LOCKED	on PROBE CORRECTION
AIRSPEED	on 0 kt
ALTITUDE	on 1013 mb.

(3) Remove access panels 215BS and 216BS from shelves 4-215 and 4-216.

C. Check of Mode Selection and Gains

(1) On centre console, align the four throttle control levers in 15° position.

(2) On ADC control panel, place ADC1 (ADC2) switch in ON position.

(3) On pressure sensor simulator connected to ADC1 (ADC2), place SENSOR-SIMUL switch in SIMUL position.

(4) On ADC control panel, press and release ADC1 (ADC2) caption light to reset.

(5) On pressure sensor simulator, set IAS of 200kt for mach number of 0.25.

(6) On AFCS control unit, engage AT1 (AT2) switch.

(a) Switch must remain engaged.

(b) IAS HOLD push-button must illuminate.

(c) KNOTS counter bar must be visible.

(7) On pressure sensor simulator increase IAS previously selected by 20kt.

(a) The four throttle control lever must move approximately 10° towards idle position, then drift slowly.

(8) Operate datum adjust unit AUTOTHROTTLE switch in INCREASE direction then in DECREASE direction.

(a) Check that the four throttle control levers move in line in direction ordered.

(b) Release switch, which must return to mid-way position, and allow the from throttle control levers to stabilize.

(9) On pressure sensor simulator reduce IAS to 200 kt.

(10) On AFCS control unit, select MACH HOLD mode by pressing push-button.

(a) MACH HOLD push-button must illuminate.

(b) IAS HOLD push-button must extinguish.

(c) KNOTS counter bar must remain visible.

(11) On pressure sensor simulator, reduce mach number by approximately 0.045.

(a) The four throttle control levers must rapidly move approximately 10° towards maximum thrust position, than drift slowly.

(12) Operate datum adjust unit AUTOTHROTTLE switch in DECREASE direction then in INCREASE direction.

(a) Check that the four throttle control levers move in line in direction ordered.

(b) Release switch which must return to mid-way position, and allow autothrottle control levers to stabilize.

(13) On AFCS control unit, set an IAS of 200 kt with SPEED SELECT knob then select IAS ACQ mode by pressing push-button.

(a) IAS ACQ push-button must illuminate.

(b) MACH HOLD push-button must extinguish.

(c) KNOTS counter bar must disappear, leaving the number 200 visible.

(14) Using SPEED SELECT knob, uncrease IAS selected by 15 kt to 215 kt.

(a) The four throttle control levers must move towards maximum thrust position.

(b) Speed discrepancy indicator lights on Captain's and First Officer's airspeed indicators must illuminate at speed of 210kt ± 2 kt.

(15) On LH console, panel 12-211 (RH console, panel 5-212), place D/B LIGHTS TEST switch in LO position then return it to HI position.

(a) Intensity of indicator light on Captain's (First Officer's) airspeed indicator must decrease, then return to normal.

(16) Carry out same operation on RH console, panel 5-212. Same result must be obtained for indicator light on First Officer's airspeed indicator.

(17) Using SPEED SELECT knob, decrease IAS previously selected to a value of 180 kt.

(a) Speed discrepancy indicator lights on airspeed indicators must extinguish when speed displayed is between 210 and 190 kt and must illuminate again when speed is below 290 kt ± 2 kt.

(18) On AFCS control unit, select IAS HOLD mode by pressing push-button.

(a) IAS HOLD push-button must illuminate.

(b) IAS ACQ push-button must extinguish.

(c) KNOTS counter bar must re-appear.

(d) Speed discrepancy indicator lights on airspeed indicators must extinguish.

(19) Disengage AT1 switch, then cancel AT warning on Warning and Landing Display indicators.

(20) On pressure sensor simulator connected to ADC1 place SENSOR-SIMUL switch in SENSOR position then disconnect cable from test connector on ADC1.

(21) Install protective cap on test connector, then install access panel 215ES (216ES).

(22) On centre console align the four throttle control levers in 15° position.

(23) On ADC control panel, place ADC1 switch in OFF position, then carry out operations described in paragraphs 4.C. (2) through 4.C. (21) referring to information in brackets. Same results must be obtained.

(24) On centre console, place the four throttle control levers in idle stop position.

(25) On ADC control panel, place ADC2 switch in OFF position.

D. Check of Accelerometers

(1) Remove protective caps from test connectors ZA and ZB on front panel of the two autothrottle computers, 1C171 and 2C171.

(2) On centre console align the four throttle control levers in mid-way position.

(3) On ADC control panel, place the two ADC1 and ADC2 switches in ON position.

(a) If ADC1 and ADC2 caption lights illuminate, reset by pressing the caption lights.

(4) On AFCS control unit, engage AT1 (AT2) switch.

(a) Switch must remain engaged.

(b) IAS HOLD push-button must illuminate.

(5) Stabilize position of throttle control levers with AUTOTHROTTLE switch on datum adjust unit.

(6) When throttle control lever position is stable, disengage AT1 (AT2) switch then cancel AT warning on the two warning and landing display indicators.

(7) Measure and note voltages U1 and U2 between terminals 71 and 1 (ground) on test connectors ZA and ZB respectively.

(8) Read and note aircraft pitch attitude, θ, expressed in degrees on Captain's (First Officer's) ADI.

(9) Check that voltages U1 and U2 are equal to + 0.96 + $[0.1 \times \theta°]$, within limits of ± 200 mV.

(10) Carry out operations described in paragraphs 4.D. (2) through 4.D. (9) referring to information in brackets for lane 2 accelerometer. Same results must be obtained.

(11) Install protective caps on test connectors ZA and ZB on the two autothrottle computers, then install access panels 215BS and 216BS.

E. Close-Up

(1) Carry out close-up for functional test (Ref. paragraph 3.L).

AUTOTHROTTLE COMPUTER - REMOVAL/INSTALLATION

1. General

WARNING : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN (22-00-00, SERVICING).

Autothrottle computers 1C 171 and 2C 171 are mounted on shelves 4-215 and 4-216 respectively in electronics rack. Locating pins are provided on rear connectors so that computer replacement with a computer of a different type is made impossible.

Removal procedures for replacement of the computers are iden-
R tical, only one procedure is described.
R Only circuit breakers associated with computer to be removed
R are tripped.

2. Computer

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.47 m (14 ft 8 in.)	
Circuit Breaker Safety Clips	

B. Prepare

(1) For removal of computer No.1 (1C 171), trip, safety and tag the following circuit breakers :

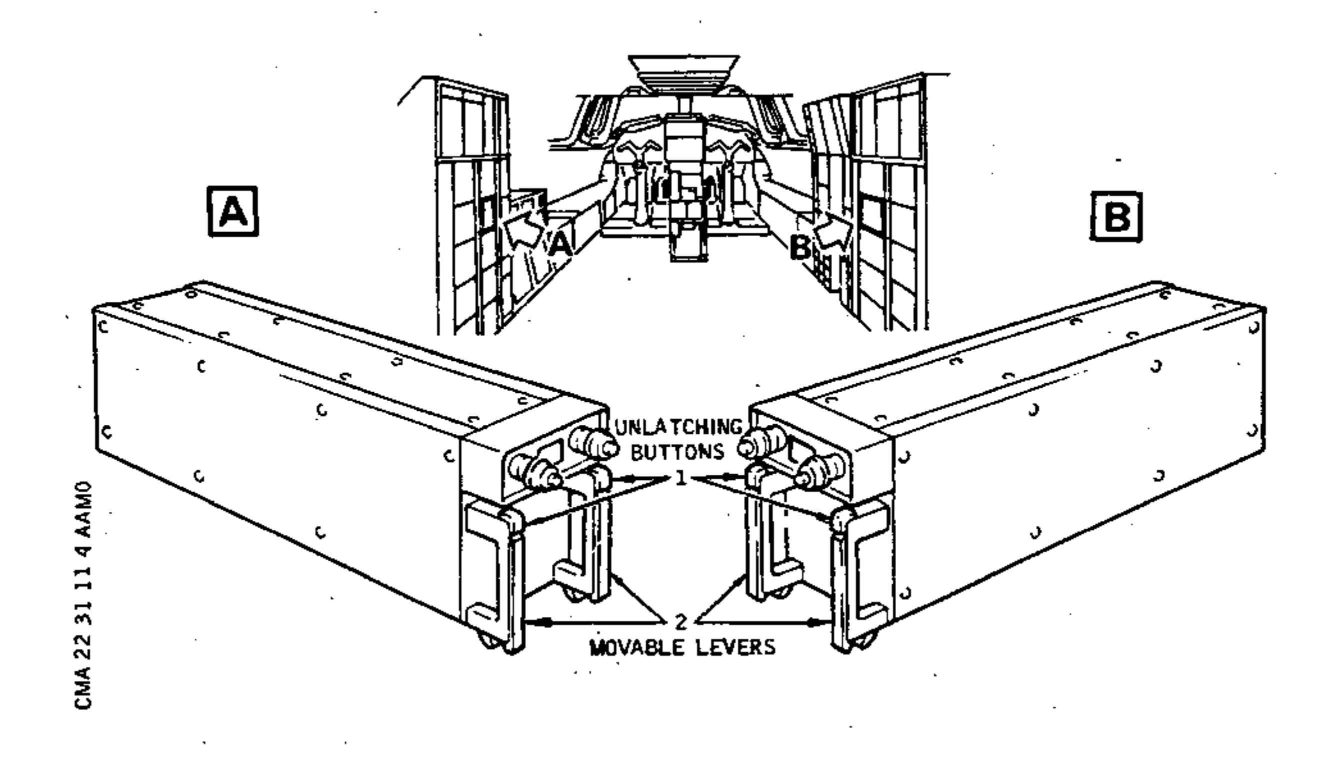
SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AT 1 CONT	1-213	1C 180	Q12
AFCS 1 CONT		1C 19	Q14
AFCS MODE SYS 1 LTS SUP	13-215	1C 273	B 5
AT SYS 1 SUP		1C 179	C 6
AT SYNCHRO SYS 1 SUP		1C 181	D 5

(2) For removal of computer No.2 (2C 171), trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AFCS 2 CONT	5-213	2C 19	A12
AT 2 CONT		2C 180	A14
AT SYNCHRO SYS 2 SUP	13-216	2C 181	B17
AT SYS 2 SUP		2C 179	D16
AFCS MODE SYS 2 LTS SUP		2C 273	E17

R R R (3) Remove panel 215BS to gain access to shelf 4-215 for removal of computer No.1 (1C171) or panel 216BS for removal of computer No.2 (2C171).

C. Remove



Location of Autothrottle Computer
Figure 401

R (1) On front face of the computer, press unlatching buttons (1) on top of the two pulling handles.

(a) The two movable levers (2) fall.

(2) Fully lower the two movable levers.

(3) Withdraw the computer by pulling the handles.

R D. Preparation of Replacement Component

R (1) Check that computer mounting is clean and that rack
R connectors are in correct condition (no corrosion).

R (2) Visually check computer for correct external condition
R (no dents) and check that connectors are undamaged and
R free from traces of corrosion.

E. Install

(1) Press the two unlatching buttons.

(a) The two movable levers fall.

R (2) Position computer on its rails.

R (3) Push computer fully home.

R (4) Lift the two movable levers until powls lock into posi-
R tion.

(5) Remove safety clips and tags and reset the circuit
R breakers prevously tripped.

F. Tests (Ref. 22-31-11, Adjustment/Test)

G. Close-Up

R (1) Install panel 215 BS or 216 BS.

R (2) Remove access platform.

AUTOTHROTTLE COMPUTER - ADJUSTMENT/TEST

1. General

WARNING : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

The following adjustment/test procedure is intended to ensure
R correct operation of each autothrottle computer.
R Test procedure being identical for each computer, only computer
R No.1 (Captain's side) test is described while information re-
R lating to computer No.2 (First Officer's side) is given in
R parentheses.

2. Operational Test

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.470 m (14 ft. 8 in.)	
Electrical Ground Power Unit	

B. Prepare

(1) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG 2	1-213	2E 461	E 3
ENG 3		3E 461	E 4
ADC 28V SUP		1F 74	P12
WARN & LDG DISPLAY SUP 1		1C 192	P13
WARN & LDG DISPLAY SUP 2		1C 193	P14
AT 1 CONT		1C 180	Q12
AP/FD SYS1 CONT		1C 17	Q13
AFCS 1 CONT		1C 19	Q14
ADC 1 26V SUP	2-213	1F 78	A 2
AP/FD SYS 1 SUP		1C 20	C 5
ADC 1 115V SUP		1C 73	F 3
LDG DISPLAY SYS 1 SUP		1C 191	F 4

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SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AF/FD 2 SYS 2 CONT	5-213	2C 17	A11
AFCS 2 CONT		2C 19	A12
AT 2 CONT		2C 180	A14
WARN & LDG DISPLAY 2 SUP 1		2C 192	B11
WARN & LDG DISPLAY 2 SUP 2		2C 193	B12
ENG 1		1E 461	D 1
ENG 4		4E 461	D 2
ADC 2 28V SUP		2F 74	F12
AP/FD COMP 1 SUP	13-215	1C 18	A 5
AT SYS 1 SUP		1C 179	C 6
AFCS MODE SYS 1 SUP		1C 273	B 5
AT SYNCHRO SYS 1 SUP		1C 181	D 5
AP/FD SYS 2 SUP	13-216	2C 20	A17
AT SYNCHRO SYST 2 SUP		2C 181	B17
AT SYS 2 SUP		2C 179	D16
AFCS MODE SYS 2 SUP		2C 273	E17
ADC 2 26V SUP		2F 78	F14
ADC 2 115V SUP		2F 73	F15
LDG DISPLAY SYS 2 SUP		2C 191	F16
AP/FD COMP 2 SUP		2C 18	F18

(2) Reset the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-216	X 345	G 4

(3) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(4) At Flight Engineer's station

(a) On EQUIPMENT BAY COOLING panel, make certain that
R electronics rack ventilation is operating (Ref. 21-21-00).

R (b) Energize INS No.1 (No.2) by placing corresponding
R MSU switch in ALIGN position. (Ref. 34-45-00,

R Adjustment/Test, Operational Test).

NOTE : AT1 (AT2) cannot be engaged until G flag has disappeared from ADI1 (ADI2).

(5) In Flight Compartment

R (a) On centre console, ADC control panel

R (a1) Make certain that both TEST selector
R switches are in NORM position.

R (a2) Place ADC1 (ADC2) switch in ON position.

R (a3) If ADC1 (ADC2) caption light illuminates, reset by pressing it : it must extinguish.

(b) On Captain's (First Officer's) instrument panel, place ATT-INS1/INS3 (ATT-INS2/INS3) switch in INS1 (INS2) position.

(c) On centre instrument panel 6-211, make certain that AFCS MODE rotary switch is in BRIGHT position

(d) On RH and LH consoles, place DB-LIGHT-TEST switch in TEST position in order to check that autothrottle mode indicator lights illuminate properly.

R (e) At LH (RH) side of AFCS control unit, place RAD/INS switch in INS position.

(f) On ceiling panel, make certain that the four AUTOTHROTTLE isolation switches are in ON position.

C. Test

R (1) Test of throttle control lever displacement and warnings by means of instinctive disconnection.

(a) On centre console, align the four throttle control levers in mid-way position.

NOTE : After each engagement, the throttle control levers may drift slightly, if the aircraft attitude is not level.
In order to cancel this drift, operate
R INCREASE-DECREASE switch of datum adjust unit located on centre console.

(b) On AFCS control unit, engage AT1 (AT2) switch.

R (b1) Switch must remain engaged.

(b2) IAS HOLD push-button must illuminate.

(c) On centre console, on AFCS datum adjust unit ope-
R rate INCREASE-DECREASE switch in INCREASE sense (Thrust increase).

(c1) Check that throttle control levers move in line towards max. thrust position.

(c2) Release switch which must return to mid-way position.

R (d) On AFCS datum adjust unit, operate INCREASE-
R DECREASE switch in DECREASE sense (Thrust decrease).

(d1) Check that throttle control levers move in line towards flight idle position.

(d2) Release switch, which must return to middle position.

(e) On Captain's side, press then release instinctive disconnect push-button on throttle control lever No.1.

(e1) AT1 (AT2) engage switch must return to OFF position.

(e2) IAS HOLD push-button must extinguish.

(e3) On both Warning and Landing Display indica-

tors, AT red warning lights must flash.

(f) On First Officer's side, press then release instinctive disconnect push-button on throttle control lever No.4.

(f1) AT warning lights must extinguish.

D. Close-Up

(1) On ADC control panel, place ADC1 (ADC2) switch in OFF position.

(2) Place the four throttle control levers in flight idle position.

(3) At Flight Engineer's station, place relevant MSU switch in OFF position in order to de-energize INS No.1 (No.2).

(4) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-216	X 345	G 4

(5) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(6) Remove access platform.

AUTO-THROTTLE ACTUATOR - REMOVAL/INSTALLATION

1. General

CAUTION : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

The autothrottle actuator is mounted in the centre console, on which the throttle control levers are located.
Each actuator output shaft is connected to the associated throttle control lever quadrant by means of a captive knurled nut which is safetied and lockwired.

NOTE : If the droop nose is in the up position, it is advisable to lower it to 5 degree position in order to facilitate removal/installation procedure (Ref. Chap. 27-61-00, paragraph 3. C. (9), Adjustment/Test).

2. Autothrottle Actuator

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.470 m (14 ft. 8 in.)	
Blanking Caps for Electrical Sockets	
Circuit Breaker Safety Clips	
Corrosion Resistant Steel Lockwire dia. 0.813 mm (0.032 in.)	

B. Prepare

(1) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AT CONT	1-213	1C 180	Q12
AFCS 1 CONT		1C 19	Q14
AFCS 2 CONT	5-213	2C 19	A12
AT CONT		2C 180	A14
AT SYS1 SUP	13-215	1C 179	C 6

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AT SYNCHRO SYS1 SUP		1C 181	D 5
AT SYNCHRO SYS2 SUP	13-216	2C 181	B17
AT SYS2 SUP		2C 179	D16

(2) Slide Captain's seat backwards (Ref. 25-11-11, Removal/ Installation).

(3) Remove First Officer's seat (Ref. 25-11-21, Removal/ Installation).

(4) Remove centre console LH side cover.

(5) Remove emergency droop nose lowering lever (Ref. 76-11-22, paragraph 2. B. (3), Removal/Installation).

(6) Remove RH side cover from centre console.

C. Remove

(1) Disconnect the two connectors (1), noting relative positions of sockets A and B.

(2) Install blanking caps on sockets.

NOTE : The four output shafts of the actuator must be disconnected from the four ball-end fittings in the following sequence order : A, D, B, C. The reverse sequence order must be followed during installation of the actuator.

(3) On each of ball-end fittings (9).

(a) Cut and remove lockwire from check nut (8).

(b) Untighten and fully loosen check nut (8) on ball-end fitting (9).

(c) Push the two serrated washers (6) and (7), hold them in contact against check nut (8).

(4) On each output shaft (4).

(a) Disconnect output shaft (4) from ball-end fitting (9) by removing captive knurled nut (5).

(b) Retain the two serrated washers (6) and (7).

(5) Cut and remove lockwire from the four mounting screws (2) on actuator (10).

(6) After disconnecting the output shafts, loosen and remove the four mounting screws (2), retain them as well as washers (3).

(7) Remove actuator (10) by withdrawing it from the First Officer's side.

D. Preparation of Replacement Component

(1) Visually check the actuator for corrosion or nick evidence, as well as electrical connectors and output shafts for damage evidence.

E. Install

(1) Offer up and position actuator (10).

(2) Insert and screw up the four mounting screws (2) together with washers (3).

(3) Screw up and tighten the four mounting screws (2) Torque to between 100 and 120 lb.in. (1.1 to 1.3 m.daN)

(4) Safety with lockwire the four mounting screws (2).

(5) Make certain that the four output shafts of the actuator are aligned.

(6) On each ball-end fitting and referring to the above paragraph NOTE, follow the sequence order specified in that paragraph.

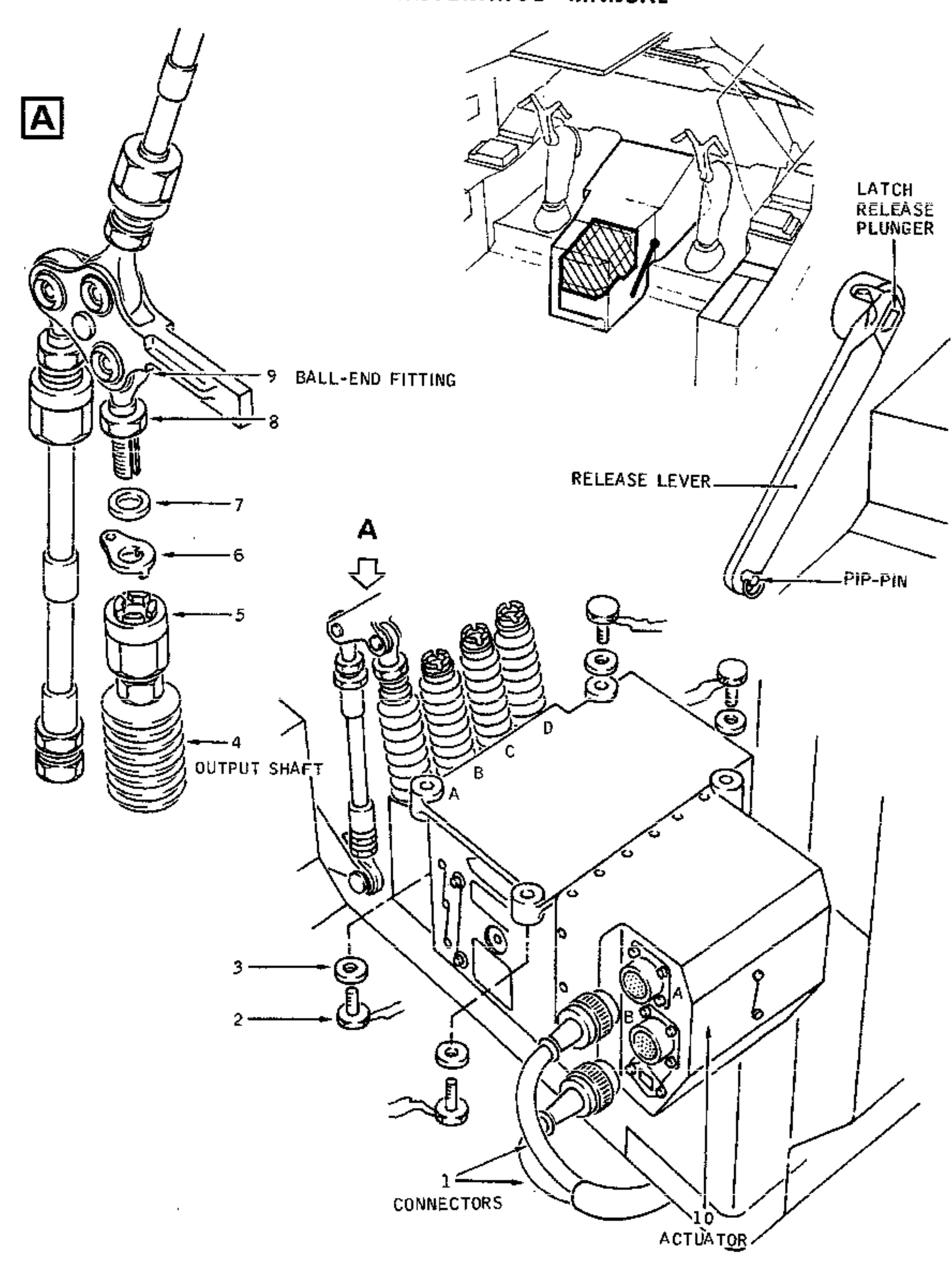
(a) Position serrated washer (7) on ball-end fitting (9) with serrations facing downwards.

(b) Position the second serrated washer (6).

<u>CAUTION</u> : THE TAB OF THE SERRATED WASHERS MUST BE BE DIRECTED FORWARD OF THE AIRCRAFT.

(c) Hold the two washers against check nut (8) on ball-end fitting.

(7) Align and offer up ball-end fitting (9) in front of output shaft (4) of actuator (10).



Autothrottle Actuator Installation
Figure 401

R

(8) Tighten knurled unit (5) on ball end fitting (9) until end of actuator output shaft (4) is in contact with end of ball end fitting.

(9) Screw up knurled nut (5).
Torque to between 30 and 36 lb.in (0.33 to 0.40 m.daN).

(10) Position the two serrated washers (7) and (6) against knurled nut (5).

(11) Tighten check nut (8) on ball-end fitting (9).

(12) Screw up check nut (8).
Torque to between 10 to 15 lb.in. (0.11 to 0.16 m.daN).

(13) Make certain that the assembly is provided with enough play in the ball-end fitting section.

(14) Safety check nut (8) to the tab of the serrated washer (6) with lockwire.

(15) Remove blanking caps from sockets.

(16) Connect the two connectors (1) to sockets A and B.

(17) Remove safety clips and tags and reset the circuit breakers previously tripped.

F. Tests

(Ref. Adjustment/Test).

G. Close-Up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2) Install side covers on centre console.

(3) Install emergency droop-nose lowering lever.

(4) Slide Captain's seat back to its normal position (Ref. 25-11-11, Removal/Installation).

(5) Install First Officer's seat (Ref. 25-11-21) (Removal/ Installation).

(6) Remove access platform.

AUTOTHROTTLE ACTUATOR - ADJUSTMENT/TEST

1. General

WARNING : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

This Adjustment/Test procedure is intended to ensure the proper operation of the autothrottle actuator. Once clutched, the actuator drives the throttle control levers according to the control signal from each computer via two identical lanes Only the Adjustment/Test procedure associated with autothrottle lane 1 is described. When carrying out the same
R procedure for lane 2, refer to information given in brackets.

2. Operational Test

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform - 4.470 m (14 ft. 8 in.)	
Electrical Ground Power Unit	
Voltmeter	

B. Prepare

(1) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ENG. 2	1-213	2E 461	E 3
ENG 3		3E 461	E 4
ADC 28V SUP		1F 74	P12
WARN & LDG DISPLAY SUP 1		1C 192	P13
WARN & LDG DISPLAY SUP 2		1C 193	P14
AT 1 CONT		1C 180	Q12
AP/FD SYS 1 CONT		1C 17	Q13
AFCS 1 CONT		1C 19	Q14
ADC 1 26V SUP	2-213	1F 78	A 2
AP/FD SYS 1 SUP		1C 20	C 5

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ADC 1 115 V SUP		1F 73	F 3
LDG DISPLAY SYS 1 SUP		1C 191	F 4
AP/FD 2 SYS 2 CONT	5-213	2C 17	A11
AFCS 2 CONT		2C 19	A12
AT 2 CONT		2C 180	A14
WARN & LDG DISPLAY 2 SUP 1		2C 192	B11
WARN & LDG DISPLAY 2 SUP 2		2C 193	B12
ENG 1		1E 461	D 1
ENG 4		4E 461	D 2
ADC 2 28V SUP		2F 74	F12
AP/FD COMP 1 SUP	13-215	1C 18	A 5
AT SYS 1 SUP		1C 179	C 6
AFCS MODE SYS 1 SUP		1C 273	B 5
AT SYNCHRO SYS 1 SUP		1C 181	D 5
AP/FD SYS 2 SUP	13-216	2C 20	A17
AT SYNCRHRO SYST 2 SUP		2C 181	B17
AT SYS 2 SUP		2C 179	D16
AFCS MODE SYS 2 SUP		2C 273	E17
ADC 2 26V SUP		2F 78	F14
ADC 2 115V SUP		2F 73	F15
LDG DISPLAY SYS 2 SUP		2C 191	F16
AP/FD COMP 2 SUP		2C 18	F18

R (2) Reset the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-216	X 345	G 4

(3) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(4) At Flight Engineer's station

(a) On EQUIPMENT BAY COOLING section, make certain that the electronics rack ventilation system is in operation, (Ref. 21-21-00).

R (b) Place INS No.1 and INS No.2 selector switches in
R ALIGN position to energize INS No.1 and INS No.2 (Ref. 34-45-00, Adjustment/Test - Operational Test).

R NOTE : The two ATs cannot be engaged until G flag
R has disappeared from both ADIs.

(5) In flight compartment, on centre console :

(a) On centre console, on ADC control panel, make certain that TEST selector switches are in NORM position.

(a1) Place ADC1 and ADC2 switches in ON position.

(a2) If ADC1 and ADC2 caption lights illuminate, reset by pressing caption lights, which must extinguish.

(b) On Captain's instrument panel, place ATT-INS 1/ INS 3 switch in INS 1 position.

(c) On First Officer's instrument panel, place ATT-INS 2/INS 3 switch in INS 2 position.

(d) On centre instrument panel 6-211, make certain the AFCS MODES switch is in BRIGHT position.

(e) On both sides of AFCS control unit, place both RAD/INS switches in INS position.

(f) On ceiling panel, make certain that the four AUTOTHROTTLE isolation switches are in ON position.

C. Test

NOTE : After every engagement, the throttle control levers may drift slightly if the aircraft attitude is not
R level. In order to cancel this, depress INCREASE-
R DECREASE switch on datum adjust unit fitted in centre console (7-211).

(1) Actuator electrical zero check

(a) On centre console, align the four throttle control levers in the 26° position.

(b) Remove protective caps from sockets ZA and ZB on
R front face of autothrottle computer 1C171 (2C171).

(c) Measure voltage between pins ZA72 and ZA1 (ground) It must be within 0 to ± 500 mV.

(d) Measure voltage between pins ZB72 and ZB1 (ground). It must be within 0 to ± 500 mV.

(e) Install protective caps on sockets ZA and ZB.

(2) Throttle control lever displacement check

(a) On centre console, align the four throttle control levers to approximately 10° position.

(b) On AFCS control unit, engage AT1 (AT2) switch.

R (b1) Switch remains engaged.

(b2) IAS HOLD push-button illuminates.

(c) On centre console

R (c1) On AFCS datum adjust unit, operate INCREASE-
R DECREASE switch in INCREASE sense.

(c2) Check that the four throttle control levers move in line towards max thrust position.

(c3) Release the switch, it must come back to the middle position.

R (d) On AFCS datum adjust unit, operate INCREASE-
R DECREASE swith in DECREASE sense.

(d1) Check that throttle control levers move in line towards the Idle positions.

(d2) Release the switch ; it must return to the middle position.

(e) On AFCS control unit, disengage AT1 (AT2) switch.

(e1) IAS HOLD push-button extinguishes.

(f) On (Captain's and First Officer's) Warning and Landing Display indicators, red AT warning light must flash.

(f1) Press either AT warning light or instinctive disconnect push-button (throttle control lever 1 or 4) in order to cancel warning.

(g) On centre console, align the four throttle control levers to approximately 10° position.

(h) On AFCS control unit, engage AT2 switch and repeat operations described from paragraph 2. C.
R (2) (b) through paragraph 2. C. (2) (f) (f1).
R Results must be identical.

(3) Check of throttle control lever isolation switches.

(a) On centre console, align the four throttle control levers to approximately 10 degree position.

(b) On AFCS control unit, operate AT1 switch.

R (b1) Switch must remain engaged.

(b2) IAS HOLD push-button must illuminate.

R (c) On centre console, operate datum adjust unit
R INCREASE-DECREASE switch in DECREASE sense.

(d) On ceiling panel, while throttle control levers are moving, successively place the four AUTO-THROTTLE isolation switches in OFF position.

(e) Check that each throttle control lever stops when associated isolation switch is placed in OFF position.

(f) On centre console, align the four throttle control levers to approximately 10 degree position.

(g) On ceiling panel, place the four AUTOTHROTTLE isolation switches in ON position.

(h) On AFCS control unit, disengage AT1 switch, then engage AT2 switch.

R (h1) Repeat operations described from (2) (c)
R (3) (b) (b1) to 2. C. (3) (g). Results must be identical.

(i) On AFCS control unit, disengage AT2 switch.

(4) Check of throttle control lever override resistance.

(a) On centre console, align the four throttle control levers to mid-way position.

(b) On AFCS control unit, engage AT1 switch.

R (b1) Switch must remain engaged.

(b2) IAS HOLD push-button must illuminate.

(c) On centre console, slowly push then bring back to initial position each throttle control lever without causing AT1 (AT2) switch to disengage.

R (d) Check that same resistance is felt on each throttle control lever.

(e) On AFCS control unit, disengage AT1 switch, then engage AT2 switch.

(e1) Repeat operations described from 2. C. (4) (b) (b1) through 2. C. (4) (d).
R Results must be identical.

(f) On AFCS control unit, disengage AT2 switch.

(g) On either Warning and Landing display indicator, press AT warning light to cancel warning.

D. Close-Up

(1) On ADC control panel, place ADC1 and ADC2 switches in OFF position.

(2) Place the four throttle control levers in Idle position

(3) At Flight Engineer's station, de-energize INS No.1 and No.2 (Ref. 34-45-00, Adjustment/Test, Operational

Test).

(4) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-216	X 345	G 4

(5) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(6) Remove access platform

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R LONGITUDINAL ACCELEROMETER - REMOVAL/INSTALLATION

1. General

R CAUTION : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN
R 22-00-00, SERVICING.

Accelerometers are located on the RH side of the aircraft centreline. Accelerometer 1C183 is associated with sub-system No.1 and is nearer with respect to the centreline ; accelerometer 2C183 is associated with sub-system No.2. Removal procedures of the accelerometers are identical. Thus only one procedure is described.

2. Accelerometer

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 2.960 m (9 ft. 8 in.)	
Protective Caps for Electrical Connectors	
Circuit Breaker Safety Clips	

B. Prepare

(1) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AT SYNCHRO SYS 1 SUP	13-215	1C 181	D 5
AT SYNCHRO SYS 2 SUP	13-216	2C 181	B17

(2) Open access door 123AB.

C. Remove

CAUTION : IT IS PROHIBITED TO LOOSEN THE TWO MOUNTING SCREWS ON ADJUSTABLE ANGLE BRACKET (2), THE LATTER BEING ADJUSTED TO PROVIDE A 10° NOSE DOWN SLOPE WITH RESPECT TO THE ACCELEROMETER

SENSITIVE AXIS.

(1) Disconnect connector (10) from socket (11) on accelerometer (5).

(2) Cap socket (11).

(3) Unscrew and remove the four mounting screws (7) from chassis (6) bearing accelerometer (5) while holding the assembly.

R (4) Carefully remove accelerometer/chassis assembly from its support.

CAUTION : HANDLE THE ACCELEROMETER WITH CARE DURING TRANSPORTATION IN ORDER TO AVOID DAMAGING THE PENDULOUS MOVING PARTS.

(5) Unscrew and remove the four mounting screws (3) from accelerometer (5).

(6) Retain chassis (6).

R (7) Remove accelerometer (5) with care.

D. Preparation of Replacement Component

R (1) Visually check accelerometer for damage and corrosion
R evidence, (in particular on socket), as well as chassis (6) and adjustable angle bracket (2).

E. Installation

(1) Install accelerometer (5) on chassis (6) with locating pin (9) inserted in the corresponding locating hole (8).

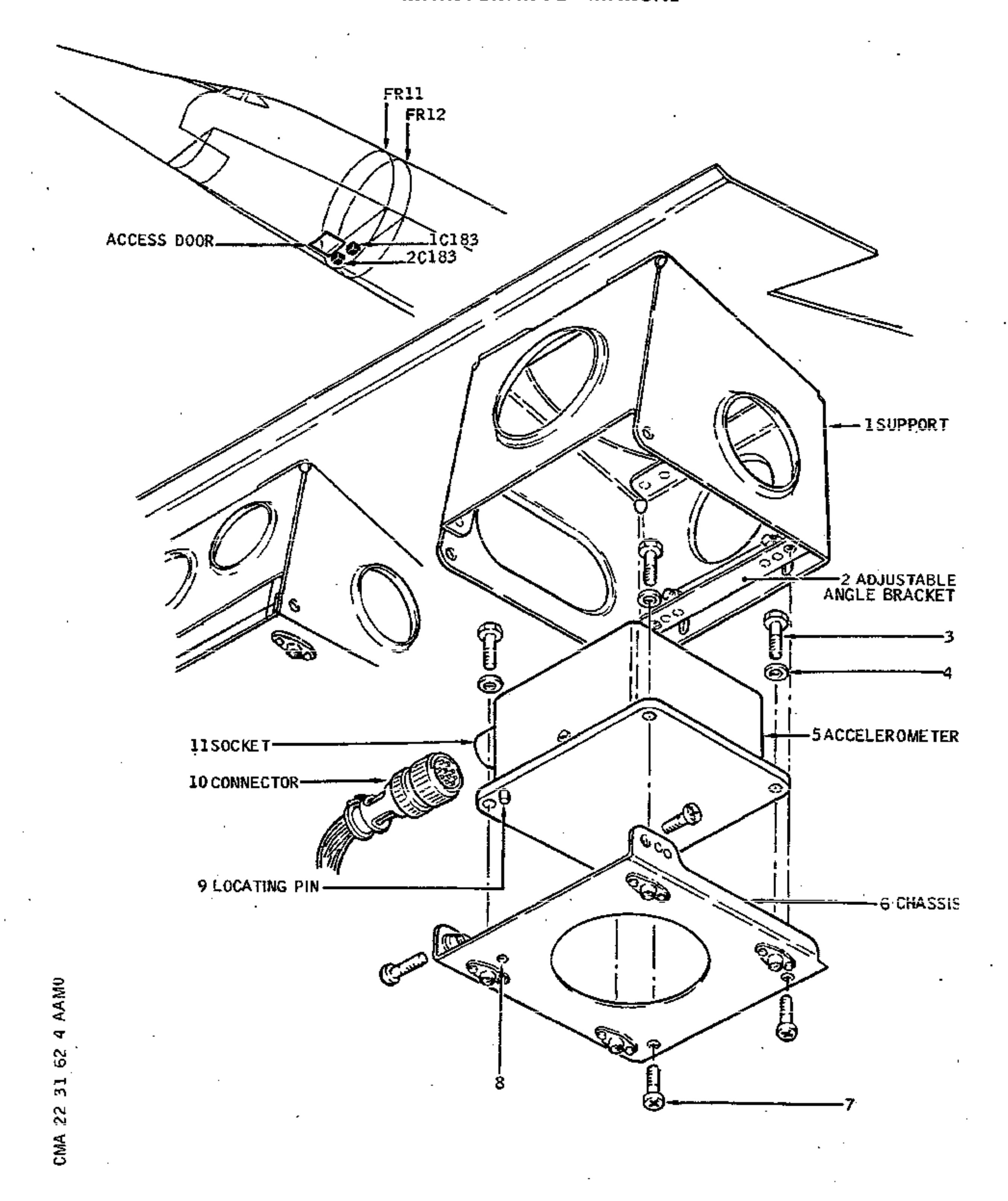
(2) Insert, screw up and tighten the four mounting screws
R (3) of accelerometer (5) together with washers (4).

(3) Offer up and carefully install the chassis fitted with the accelerometer on support (1).

(4) While holding the assembly, secure the latter to support (1) by means of the four mounting screws (7).

R (5) Remove protective cap from socket (11) on accelerometer (5).

(6) Connect connector (10) to socket (11).



R Longidutinal Accelerometer Installation
Figure 401

(7) Remove safety clips and tags and reset the circuit breakers previously tripped.

F. Tests

R (Ref. 22-30-00 Adjustment/Test - Operational Test,
R Paragraph 2.C.).

G. Close-Up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2) Close access door 123AB.

(3) Remove access platform.

AUTOTHROTTLE INSTINCTIVE DISCONNECT PUSH-BUTTON REMOVAL/INSTALLATION

1. General

CAUTION : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

The autothrottle system instinctive disconnect push-buttons 1C182 and 2C182 are installed respectively on (Captain side) throttle control lever No.1 and (First Officer's side) throttle control lever No.4.
The removal procedure is identical for both autothrottle instinctive disconnect push-buttons.

2. Autothrottle Instinctive Disconnect Push-Button

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.470 m (14 ft. 8 in.)	
Circuit Breaker Safety Clips	
Bonding with Bakelite 18774/1 and Versamid 140	20-25-14
Potting of Electrical Connections	20-27-13, Para. 5B
Soldering of Electrical Connections	20-27-19

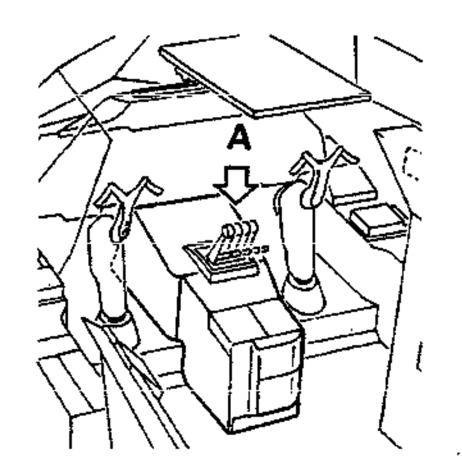
B. Prepare

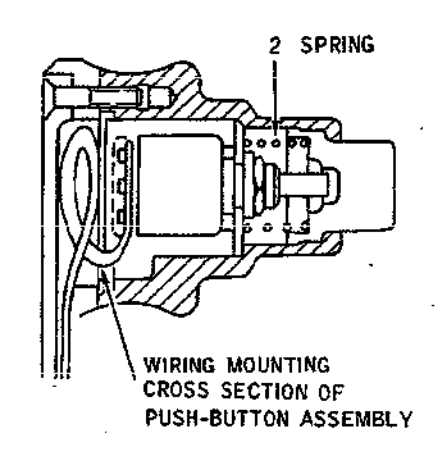
(1) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AT SYS 1 SUP	13-215	1C 179	C 6
AT SYS 2 SUP	13-216	2C 179	D16

C. Remove

(1) On throttle control lever external face, at push-





CROSS SECTION OF
PUSH-BUTTON ASSEMBLY

1 SWITCH COVER
PUSH-BUTTON
3
B
4 MOUNTING
BRACKET
12 WIRING
MOUNTING
HOLE
5
6
7
B
8
THROTTLE
CONTROL LEVER
9
10 SWITCH
11 BACKING DISC
A

CMA 22 31 63 4 AAMO

AT Instinctive Disconnect Push-Button -
Installation
Figure 401

button level, on location of three screw heads (8), as shown on figure, scrape painting then remove the product covering the screw heads.

(2) Remove the three attaching screws (8) from switch cover (1).

(3) Carefully remove switch cover (1), spring (2) and push-button (3) from throttle control lever.

(4) Remove potting product from gap between switch (10) and backing disc (11).

(5) Slide backing disc (11) into the free length of wiring in order to slacken the connections.

(6) Identify the six wires from the switch terminals (10), then remove them from terminals by means of a soldering iron.

(7) Remove screw (5), lock washer (6) and tab washer (7), then remove switch (10) from its mounting bracket (4).

(8) Remove switch (10).

D. Preparation of Replacement Component

(1) Check switch for evidence of nicks and corrosion.

(2) Check for correct condition of terminals.

(3) Check that switch push-button moves smoothly over full length of travel.

E. Install

(1) Connect the six wires to the switch (10) six terminals by means of a soldering iron.

(2) Insert switch (10) into mounting bracket (4).

(3) Install tab washer (7), then lock washer (6) on switch (10) threaded end.

(4) Install then tighten screw (5).

(5) Coat switch (10) rear face with potting product.

(6) Slide backing disc (11) along wiring until it comes in contact with mounting bracket (4), with associated attaching screw recesses facing.

(7) Position mounting bracket (4), switch (10) and backing disc (11) assembly, taking into account wiring routing against throttle control lever internal face.

(8) Insert the three attaching screws to line up assembly.

(9) Position switch cover (11), spring (2) and push-button (3), with number of throttle control lever visible.

(10) Tighten the three attaching screws (8).

(11) Check that push-button operates correctly.

(12) Fully tighten the three attaching screws (8).

(13) Remove safety clips and tags and reset the circuit breakers previously tripped.

F. Test

(1) Engage autothrottle system, then proceed to AT warning cancellation and disengagement test (Ref. 22-31-00, Adjustment/Test - Operational Test, paragraph 2.E).

G. Close-Up

(1) Cover screw heads with bonding product until it is flush with throttle control lever external face.

(2) Re-point screw head locations.

(3) Remove access platform.

SYSTEM MONITOR - DESCRIPTION AND OPERATION

1. General

Two system monitors are fitted in the aircraft :

The first system monitors the approach and automatic landing and also indicates autopilot and autothrottle failures during cruise flight. It is called the Warning and Landing Display (WLD).

The second monitors in flight and checks the associated AFCS systems on the ground. It is called ITEM.

2. Description and Operation

A. Warning and Landing Display (Ref. Fig. 001)

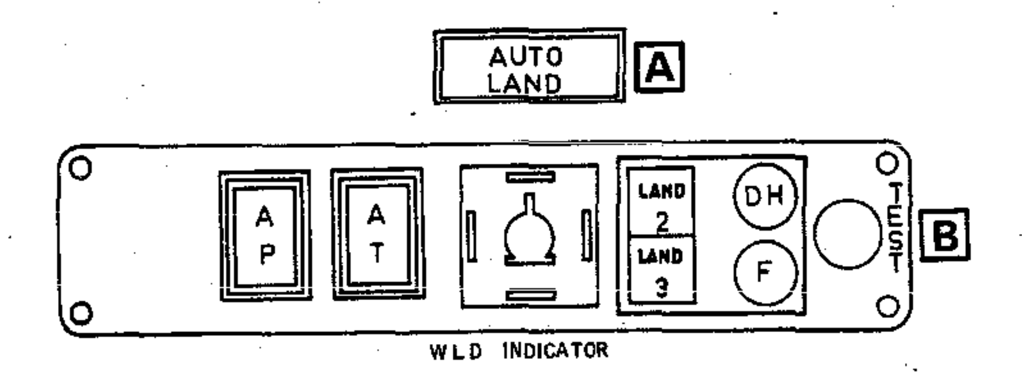
The WLD system consists of two computers each associated with an indicator.
Two AUTOLAND indicators complete the system assembly.

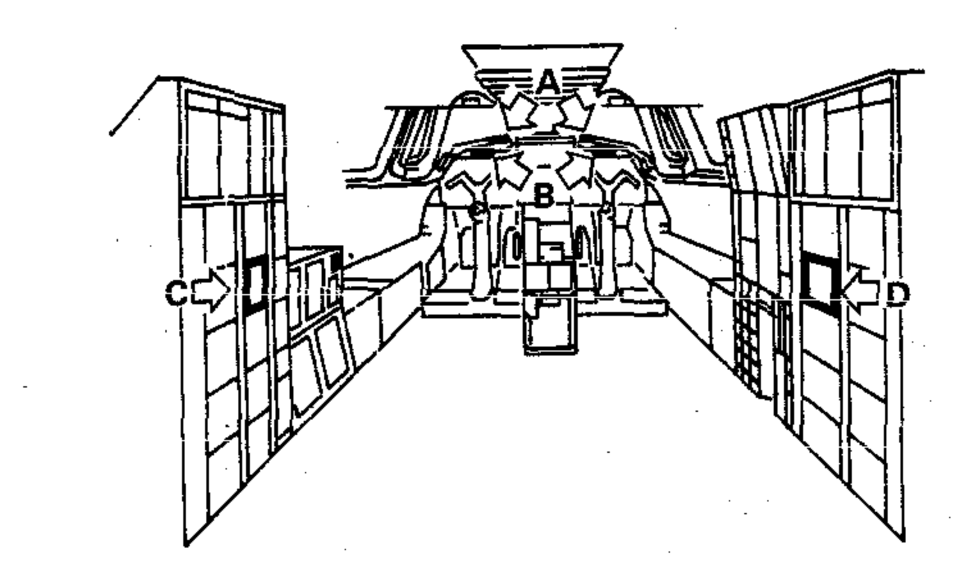
The computer controls the warning and landing system. These warnings as well as the operational state of systems associated with the automatic landing, are displayed to the pilots by means of the indicator.

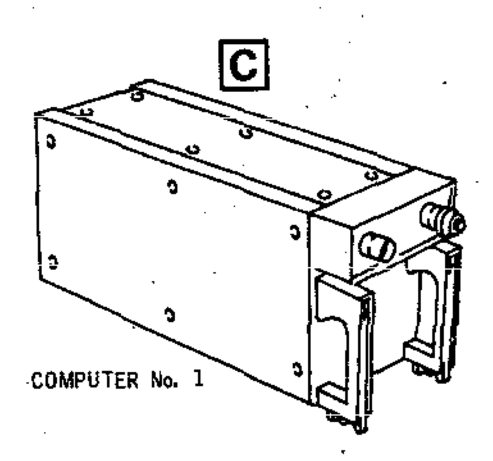
B. ITEM System (Ref. Fig. 002)

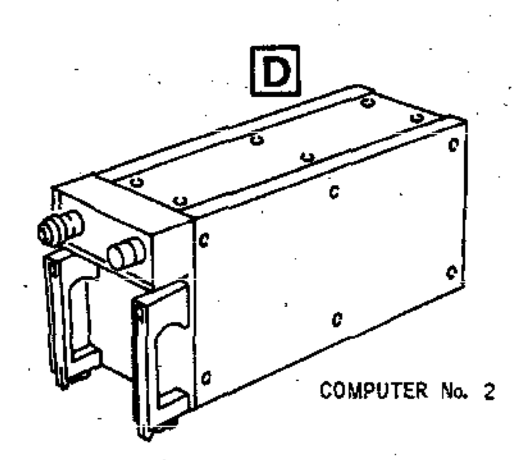
The ITEM system comprises two computers and one control and display unit.
This system can be used on the ground during maintenance or for locating a defective unit following a fault report.

In flight, it also indicates the unit which caused an unwanted AFCS system disconnection ; all faults are stored in the ITEM memory.



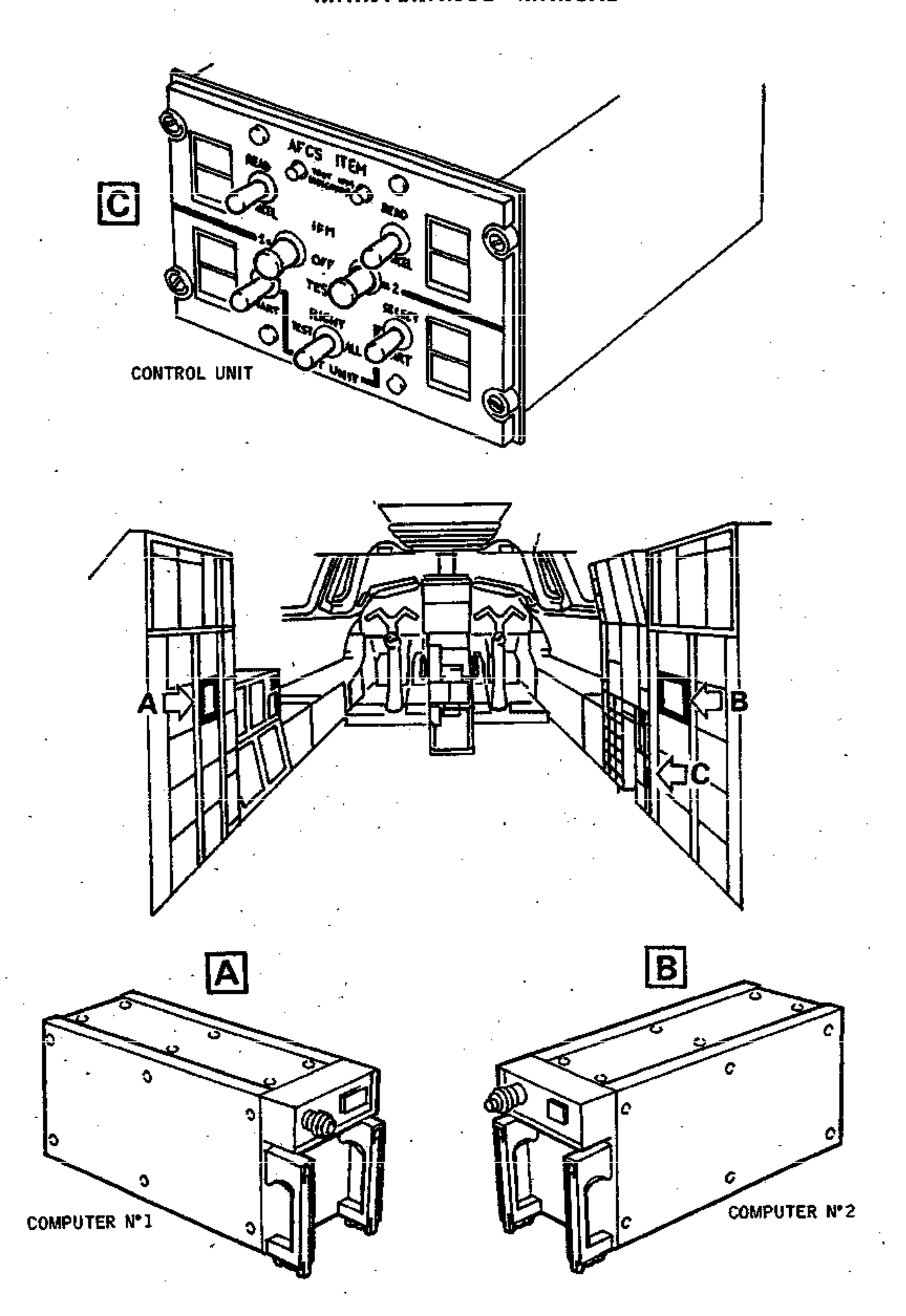






CMA 22 40 00 0 AAM0

WLD Components
Figure 001



CMA 22 40 00 0 ACMO

ITEM Components
Figure 002

END OF THIS SECTION

NEXT

1. General

R The warning and landing display (W & LD) system is intended to provide the pilot with data related to operating condition and functional capability of the AFCS during automatic approach and landing. It issues AP/FD and AT disengagement signals. The system also indicates failures which may affect the autopilot and the autothrottle within the whole flight envelope. On ILS receiver failure, it cancels the FD control bars displayed on the ADIs.
It consists of two identical channels; channel No.1 on the Captain side and channel No.2 on the First Officer side.

Both channels are supplied as soon as the aircraft electrical network is energized.

Both channels operate simultaneously. Each computer is
R associated with the indicator of the same side. Some functions are interconnected.

R The warning and landing display computers process only logic data, and therefore differ from the other AFCS computers.

R During maintenance operations, part of each W & LD computer
R is connected to the automatic test system (ITEM).
These tests can be performed on the ground only.

2. Description (Ref. Fig. 001)

The W & LD system includes :

Two computers (1C188 and 2C188) on shelves 4-215 (LH side) and
R 4-216 (RH side) respectively on the electronics racks.

R Two indicators (1C189 and 2C189) located on the Captain and First Officer instrument panels (respectively).

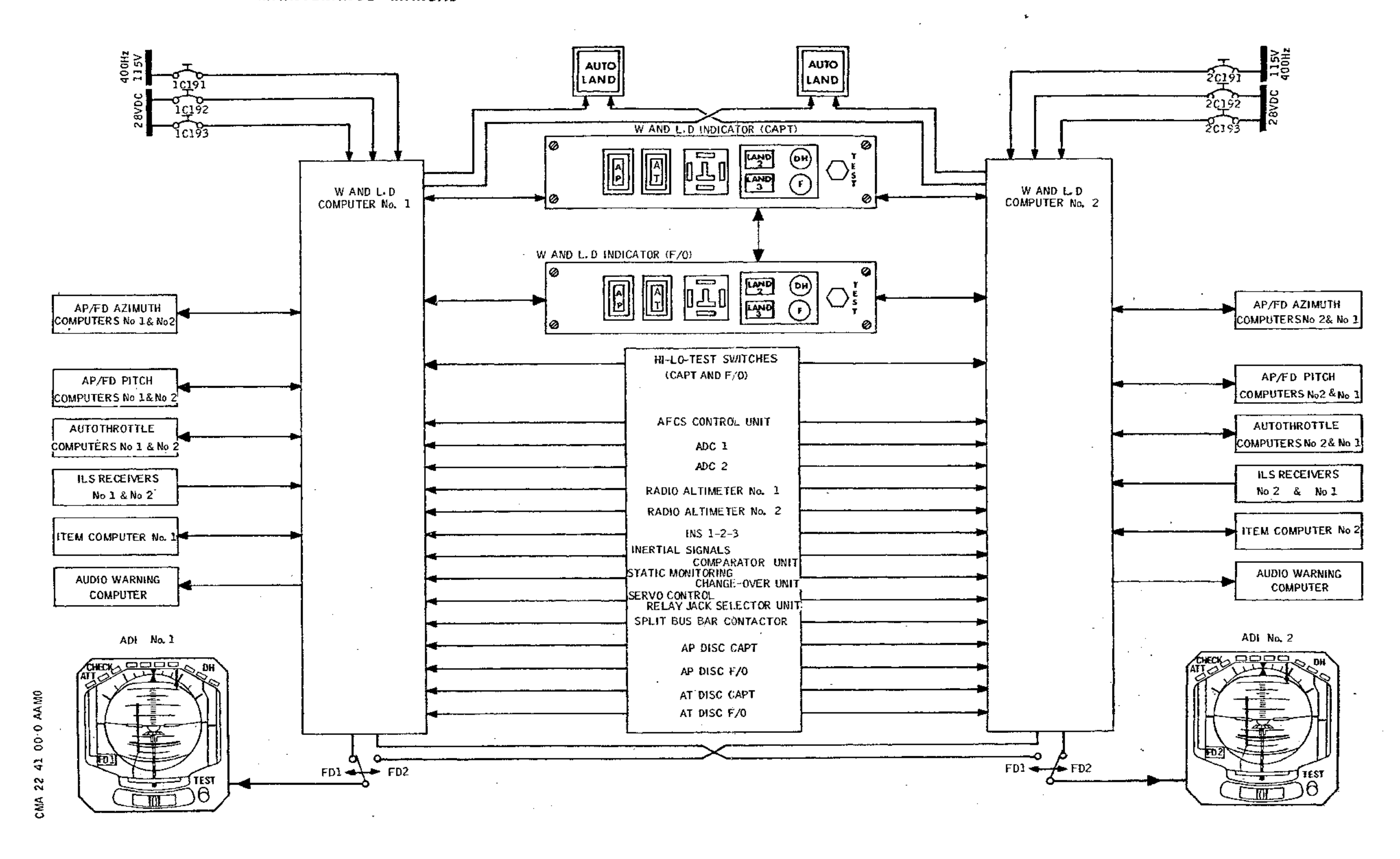
Two AUTOLAND warning lights (1C190 and 2C190) located on the glareshield instrument panel.

Each computer receives one 115V-400Hz, and two 28VDC power supplies.

R The system is associated with the following equipment :

R The AP/FD and the AT computers, which signal their engagement
R status and the failures originating in their systems.

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R

Warning and Landing Display System Block Diagram
Figure 001

R The ILS receivers, which provide the aircraft path deviation from the ILS references.
R They also signal their failure :

R ADC1 and ADC2, which signal their failure.

R The radio altimeters, which provide information which is used
R through the W & LD computers to obtain the 600 ft, 300 ft,
R and 200 ft contacts. They also signal their failure.

R INS No.1 and INS No.2, which signal their failure.

R The ISCU (inertial signals comparator unit), which provides di-
R sengagement signals in cruise flight and approach flight and
R COURSE SET FW signals, and signals INS 3 failure as well as its
R own failure.

R The static monitoring change-over unit, which signals the ope-
R rating mode (electrical or mechanical) of the power flight con-
R trol units (PFCU).

R The servo-control relay jack selector unit, which signals whether the Green hydraulic supply is available on the relay
R jacks.

R The split busbar contactors, which signal when power supply is
R divided into channel 1 and channel 2.

R It also receives information on action on AP disconnect AP DISC push-buttons and AT instinctive disconnect push-buttons.

R The FD bar analog control signals, generated in the AP/FD computers go through the W & LD computers, which in some cases provide failure warning cancellation.
R Two 3-position switches (HI-LOW-TEST) installed in the LH and RH side consoles are used to test and adjust illumination intensity of the system lights.

R <u>NOTE</u> : The AUTOLAND, AP and AT warning lights and the excessive beam deviation bars cannot be dimmed.

R 3. Indicator - Warning and Landing Display

A. Description and Operation (Ref. Fig. 002)

R Each indicator is made up of

R (1) One red AP warning light connected to the autopilot
R system. It has two lamps (the LH one controlled by computer No.1, and the RH one controlled by computer No.2).
This warning light indicates total loss of the AP, its illumination is steady and accompanied by a cavalry charge aural warning generated by the audio warning computer.

R (2) One red AT warning light connected to the autothrottle
R system. It has two lamps (the LH lamp controlled by computer No.1, the RH lamp controlled by computer No.2).
R It indicates total loss of the autothrottle system.
R This warning light flashes.

R (3) A beam deviation indicator connected to the AP/FD
R (Ref. Fig. 003)

R This indicator is made up of :

(a) White vertical and horizontal bars for LOC and GLIDE beam deviations respectively.
R Each LOC bar has two lamps (the upper lamp being controlled by computer No.1 and the lower lamp by computer No.2).

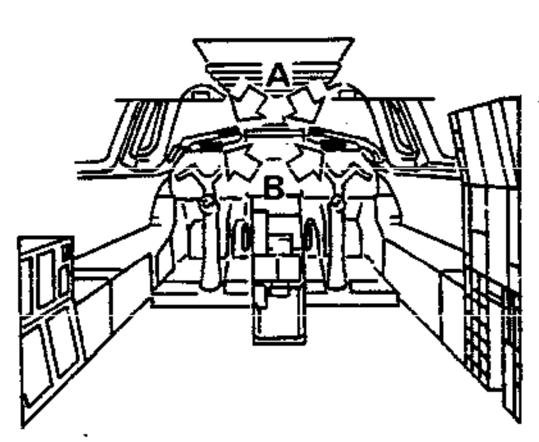
R Each GLIDE bar has two lamps (the LH lamp is controlled by computer No.1 and the RH lamp by computer No.2).

(b) An amber aircraft symbol.
R This has two lamps (the LH lamp is controlled by computer No.1 and the RH lamp is controlled by computer No.2.).

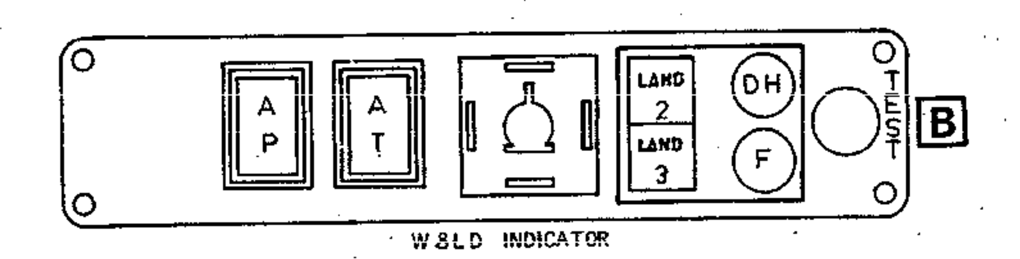
R This indicator has two functions :

- It indicates aircraft deviation with respect to LOC or GLIDE beams through illumination of one (or two) bars and of the aircraft symbol. For instance, if the aircraft is below the
R GLIDE beam and on the left of the LOC beam,
R the upper and RH bars and the aircraft symbol
R illuminate.





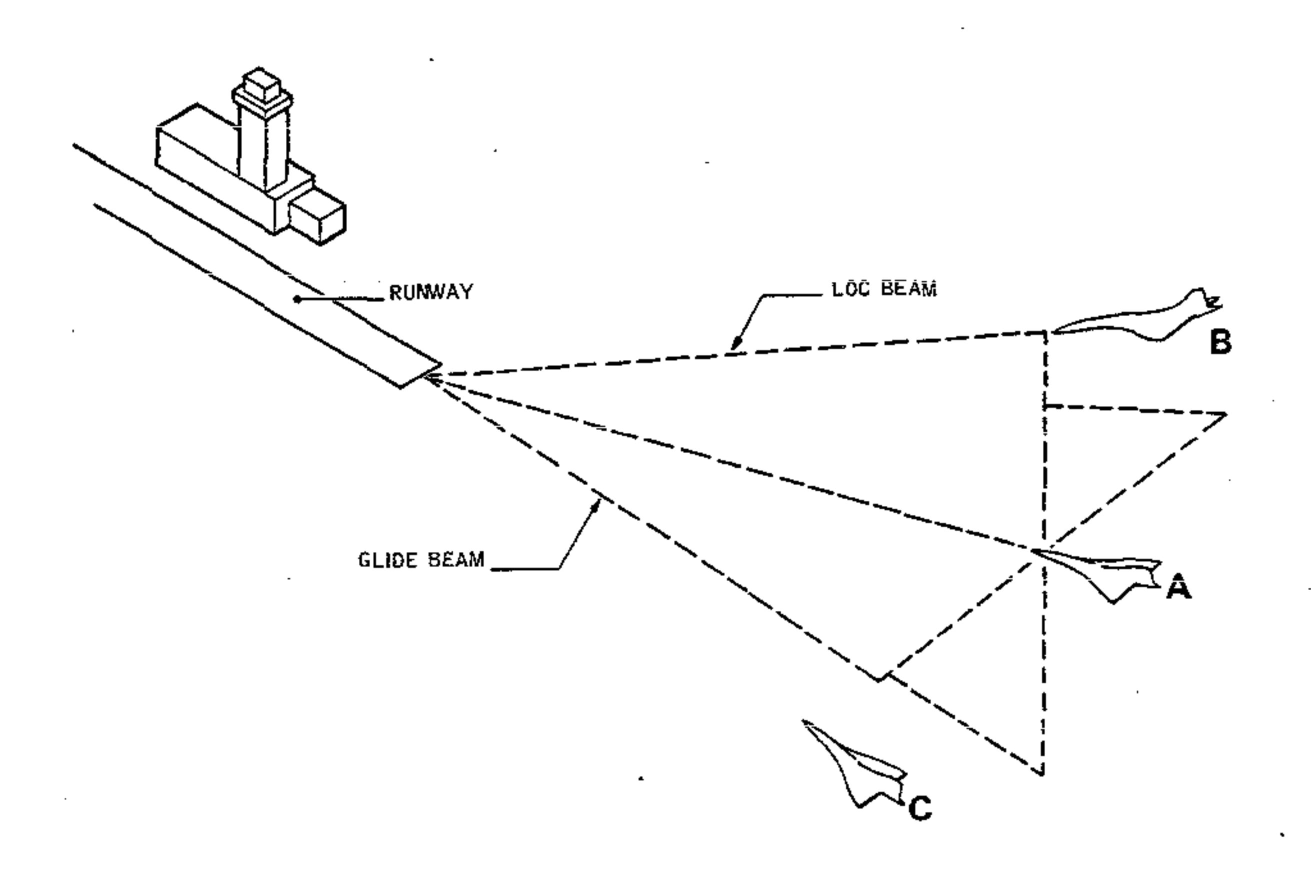
FLIGHT COMPARTMENT

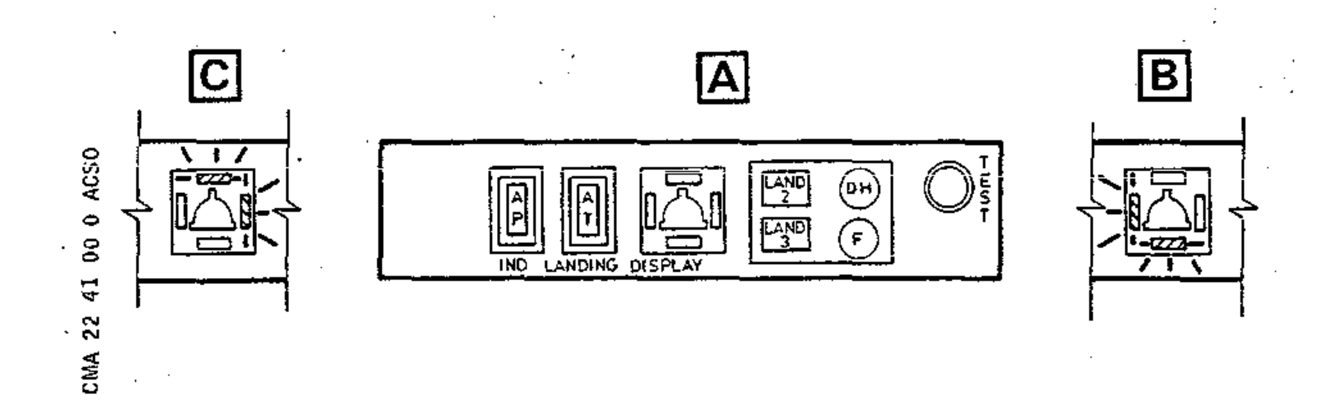


WSLD INDICATOR

CMA 22 41 00 0 ACM0

WLD Indicator and AUTO LAND Indicator Light
Figure 002





Excessive ILS Beam Deviation Indicating
Figure 003

R

- It indicates a receiver or transmitter failure.

If the receiver is defective, the associated bars and the aircraft symbol flash.

If the ground transmitter is defective, only the bars flash and the aircraft symbol remains extinguished.

(4) Two green caption lights indicating LAND2 and LAND3 capabilities. Each caption light has two lamps controlled by the associated computer.
These have two functions :

(a) They indicate automatic approach and landing capabilities according to the operating condition of peripheral equipment associated with the automatic landing.

- LAND2 caption light illuminated (cat. II approach)
- LAND2 and LAND3 caption lights illuminated (cat. III approach).

(b) They also indicate when a channel (1 or 2) is defective through LAND 2 and LAND 3 caption lights on the associated W & LD indicator going off.

(5) One amber DH caption light.
This has two lamps controlled by the associated computers.
This caption light comes on independently of AP or FD engagement when the altitude detected by the associated radio altimeter is lower than the decision height selected on the radio altimeter indicator.

B (6) One green F caption light, is deleted by mod CM4213

(7) One TEST push-button

This push-button is used to carry out the test of the lights installed in the indicators as well as the test of beam deviation thresholds in the computers.

The test can be carried out in any flight phase irrespective of the systems engaged or modes selected.

When either TEST push-button is pressed :

- All lights come on associated indicator.
- The red AT and AP warning lights, the white beam

deviation bars and the amber aircraft symbol come on the other indicator.

- The two steady red AUTOLAND warning lights come on

- The cavalry charge aural warning sounds for one second.

4. Warning Lights - AUTOLAND

A. Description and Operation (Ref. Fig. 002)

R These are installed in the glareshield instrument panel on both sides of the AFCS control unit.
R Each light has 4 lamps. Both LH lamps are controlled by computer No.1 and both RH lamps by computer No.2.
R These red warning lights flash to indicate to the Pilot that the automatic approach cannot be continued.
The conditions for illumination of these lights are listed
R in paragraph 5.C.(8).

R 5. Computer - Warning and Landing Display

A. Description

R The computer associated with channel No.1 is installed
in shelf 4-215.
R The computer associated with channel No.2 is installed
in shelf 4-216.
R On the front face there are two handles which are provided
R for removal or installation of the computer on its mount.
R Between the two handles there are two receptacles, ZA and
R ZB, used to test the computer ;
An elapsed time indicator, located between the two test
R receptacles is power supplied on computer energization (a
pointer vibrates to show that power supply is provided);
R The 4 receptacles on the rear of the computer are used
for connection with the aircraft electrical network.

B. Computer Components

Each computer comprises :

- 1 power supply unit
R - 11 logic circuit-boards.

These logic circuit-boards process the control signals
R of all the W & LD system indicator and warning lights, the
R AP/FD and AT systems disengagement signals, and ADI FD
bars cancellation.

C. Operation

(1) Power supply unit (Ref. Fig. 004)

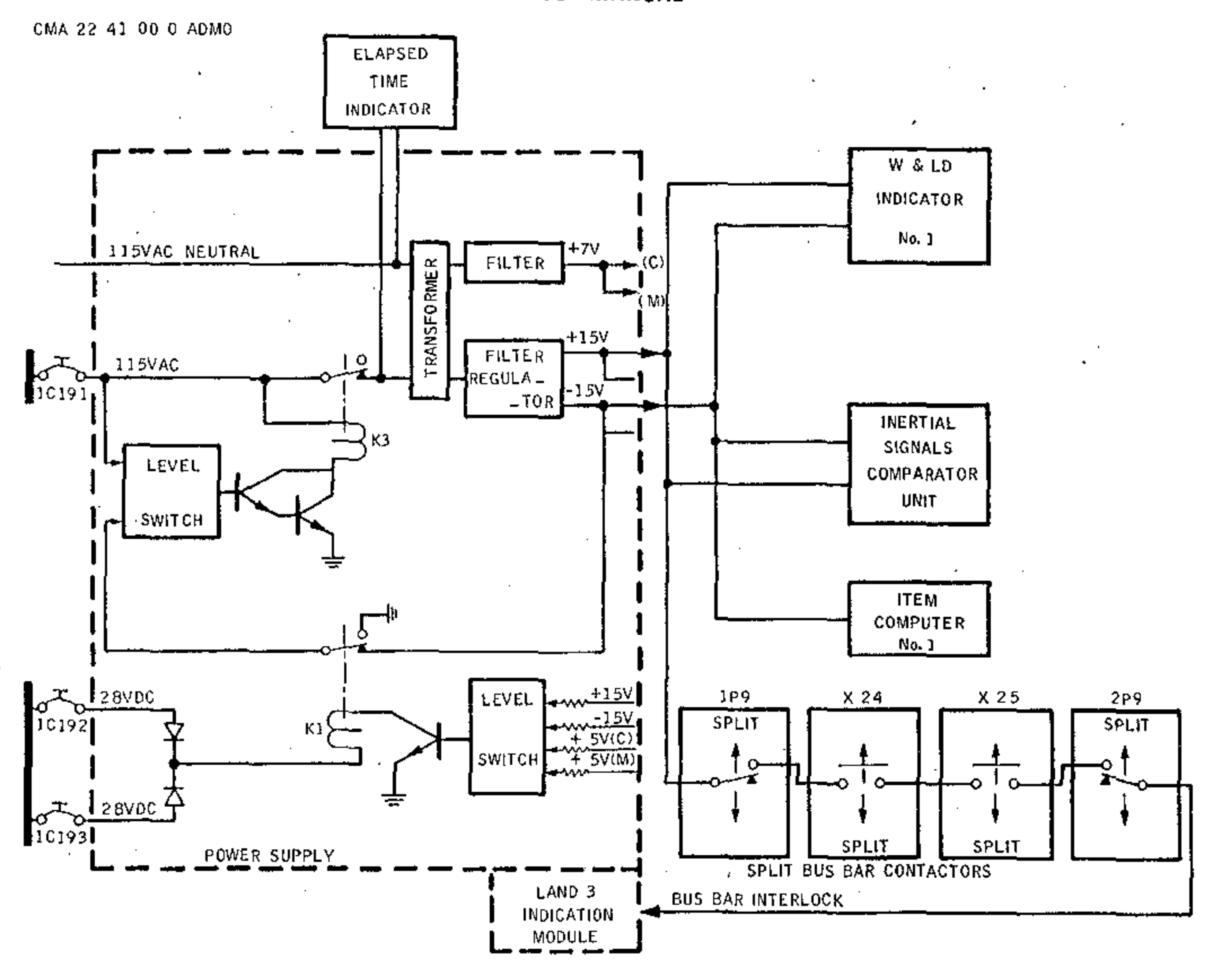
R By means of the 115V-400 Hz and 28VDC supplies this
R generates the following voltages.

R (a) Stabilized + 15 V and - 15 V (control and moni-
R toring) voltages, used in :

R - Computer (circuit-board supply)
- W & LD indicators (circuit for cancellation of
AP and AT warnings)
R - ISCU (logic of autothrottle and autopilot dis-
connection signals)
- ITEM (W & LD computer supply monitoring)
- Check of bus bar split used in capability logic.

R (b) + 7 V (control and monitoring) supply for digital
R logic and self test circuit boards.

CMA 22 41 00 0 ADMO



R

W & LD Computer Power Supply Unit
Figure 004

R NOTE : Other voltages are generated outside the power supply unit :
Stabilized (control and monitoring) + 4.5 V supply to digital circuits, derived from power supply unit + 15 V and + 7 V voltages.

Stabilized (control and monitoring) + 12 V, - 12 V supplies to analog circuits, derived from + 15 V and - 15 V voltages.

R + 15 V, - 15 V, + 4.5 V and 28 VDC supplies are monitored by means of a level switch (K1).
If a failure occurs, - 15 VDC is cut-off and causes 115 V, 400 Hz power supply to
R be cut-off through a level switch (K3).
This supply cut-off can be noticed on the
R elapsed time indicator (the pointer stops
R vibrating).

(2) AP warning module (Ref. Fig. 005)

This module receives engage signals from both APs, and also receives information when the AP disconnect (A/P DISC) push-buttons are pressed.
It controls AP red warning lights by sending a 28VDC -
R signal to both W & LD indicators. It also sends a 28VDC
R signal to the audio warning unit to trigger the cavalry
R charge aural warning.

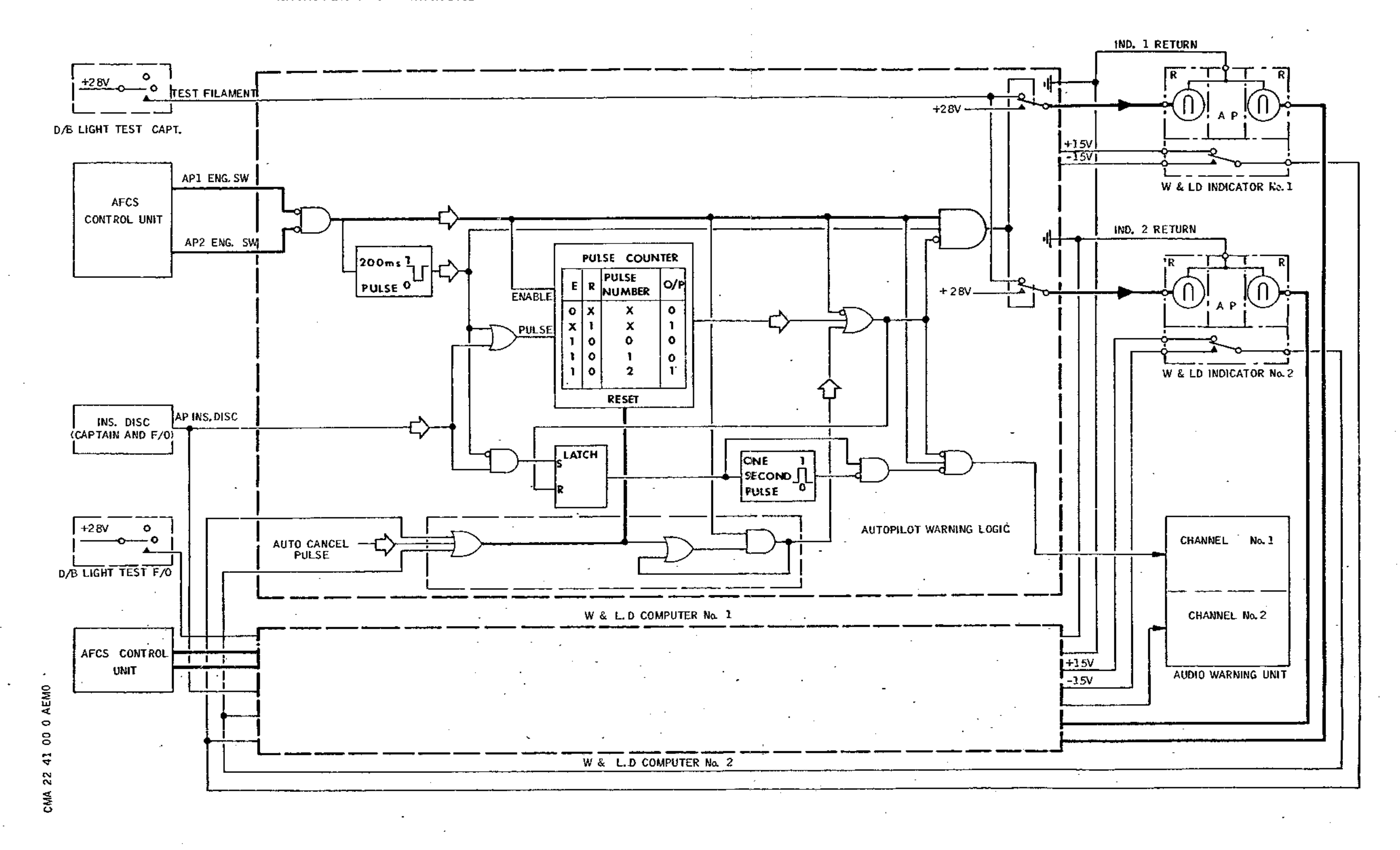
R In case of total loss of automatic flight control (loss of one AP during cruise flight or loss of both APs during automatic approach) caused by an automatic
R disconnection controlled by the internal monitoring
R or a disconnection controlled by the crew, both AP
R warning lights come on and the cavalry charge aural warning sounds.

NOTE : When the AP is manually disengaged, the aural warning is limited to 1 second.

To cancel aural and visual warnings, two possibilities
R are available :

R - Press either AP disconnect (A/P DISC) push-
R button.
R - Press either AP caption light

To cancel the aural warning only, the pilot
R presses the AUDIO CANCEL push-button.



R

AP Warning Module
Figure 005

(3) AT warning module (Ref. Fig. 006)

This module receives engage signals from the auto-throttle system and also receives information when the AT instinctive disconnect push-buttons are pressed. It causes the red AT warning lights to flash in the following conditions :

(a) Total loss of both autothrottle channels caused by a disconnection originated by the internal monitoring or controlled by the crew.

(b) In altitude acquisition mode, when at least one autothrottle channel is not already engaged with the AP or FD in ALT ACQ mode.

(c) At glide capture, if at least one autothrottle channel is not engaged and provided the AP/FD is not in GO AROUND.

To cancel the warning, three possibilities are available :

- Press either AT instinctive disconnect push-button on throttle control levers No.1 and No.4.
- Press either AT warning light
- Engage one autothrottle channel (altitude acquisition, glide capture) or the healthy autothrottle channel (after disconnection of defective AT channel by the internal monitoring)

(4) Beam deviation and ILS failure module

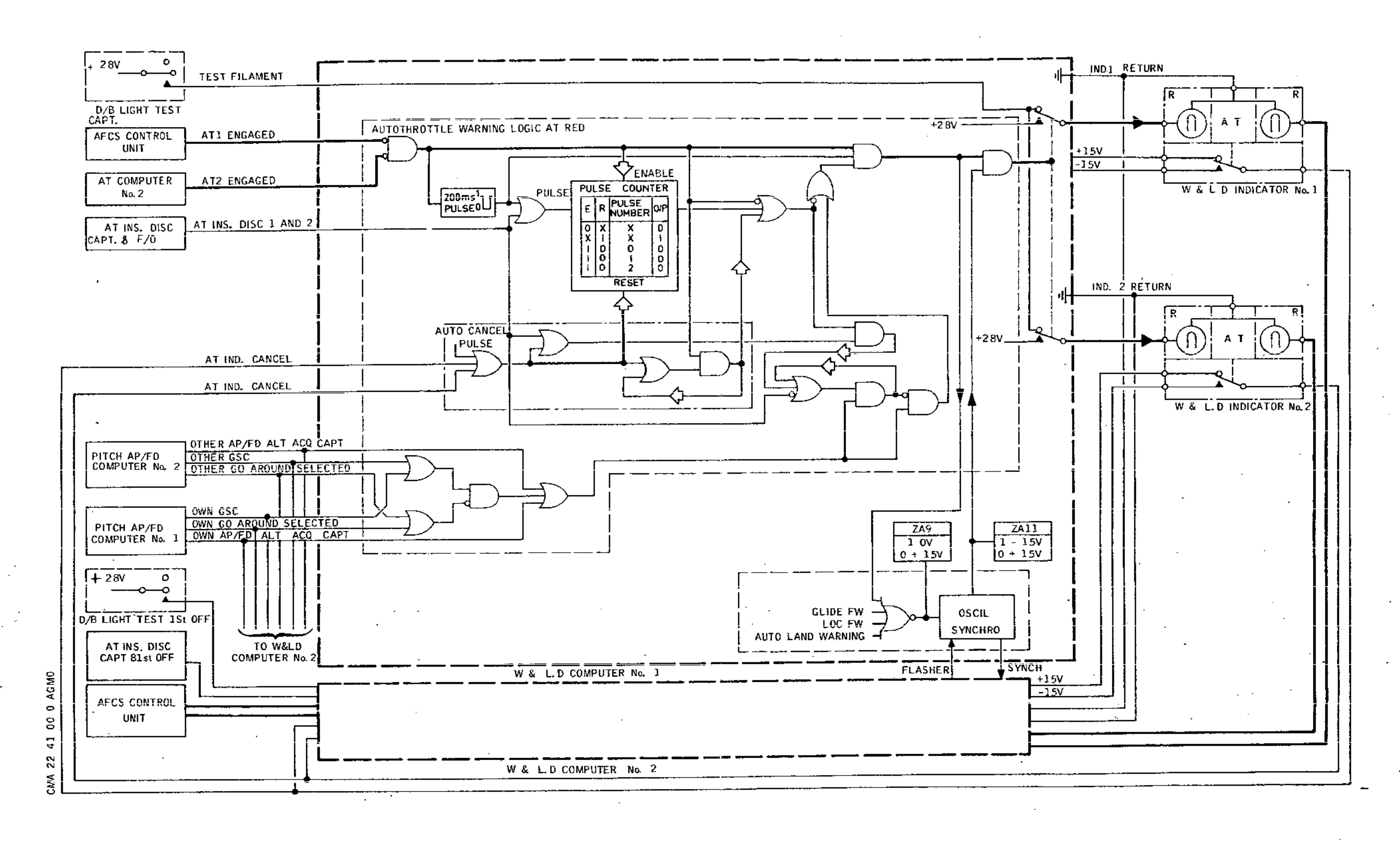
This module controls illumination of beam deviation bar(s) and aircraft symbol according to the ILS information received.

(a) Excessive deviation indicating (Ref. Fig. 007)

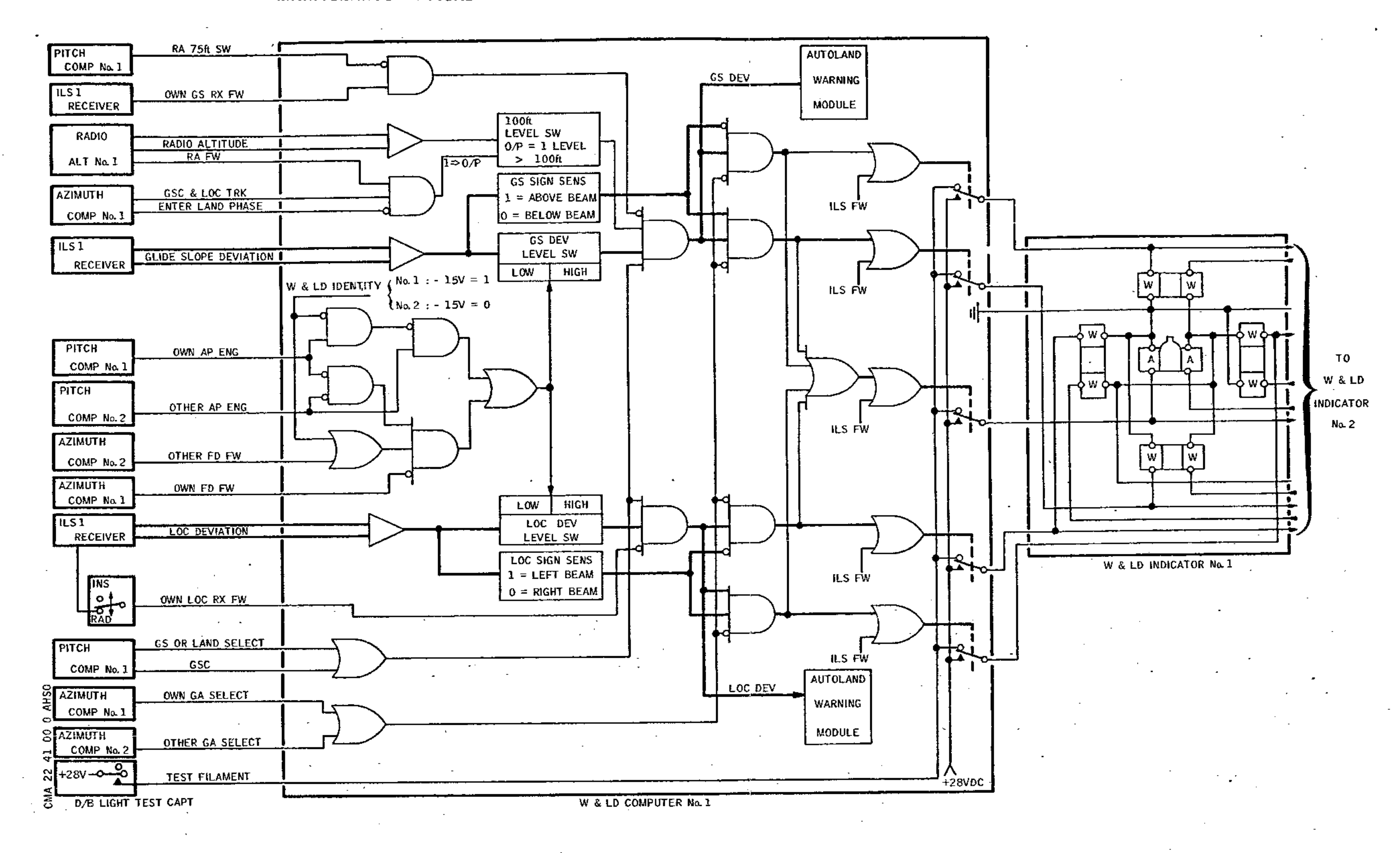
This is active when the aircraft is in the ILS reception zone (i.e. after ILS flags disappear on both HSIs and on both ADIs), after selection of GLIDE or LAND mode.
The corresponding beam deviation bars and the aircraft symbol illuminate whenever the beam deviation is greater than a threshold level.
The thresholds on the channel in control are adjusted to the following values :

LOC signal threshold : 17μA
GLIDE signal threshold : 75μA.

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AT Warning Module
Figure 006



Excessive Beam Deviation Module
Figure 007

To avoid undesirable beam deviation indicating by the W & LD channel not associated with the AP channel in control, the thresholds are increased for this W & LD channel.
The thresholds on the channel in standby are adjusted to the following values :

LOC signal threshold : 25µA
GLIDE signal threshold : 85 µA.

NOTE : When neither AP is engaged but both FDs are engaged, FD1 is considered to be the active channel.

The excessive beam deviation warning associated with the LOC beam is active down to the ground.
The excessive beam deviation warning associated with the GLIDE beam is not active below 100 ft.
If the approach is carried out in GLIDE mode and there is a radio altimeter fault, the altitude is considered to be always greater than 100 ft, and the excessive beam deviation warning is then active down to the ground.

These alarms are cancelled if a GO AROUND is initiated.

(b) Receiver fault indicating (Ref. Fig. 008)

These faults are taken into consideration from glide slope capture (GSC), as long as the AP associated with the faulty receiver side is engaged.
GLIDE receiver faults have no effect below 75 ft.

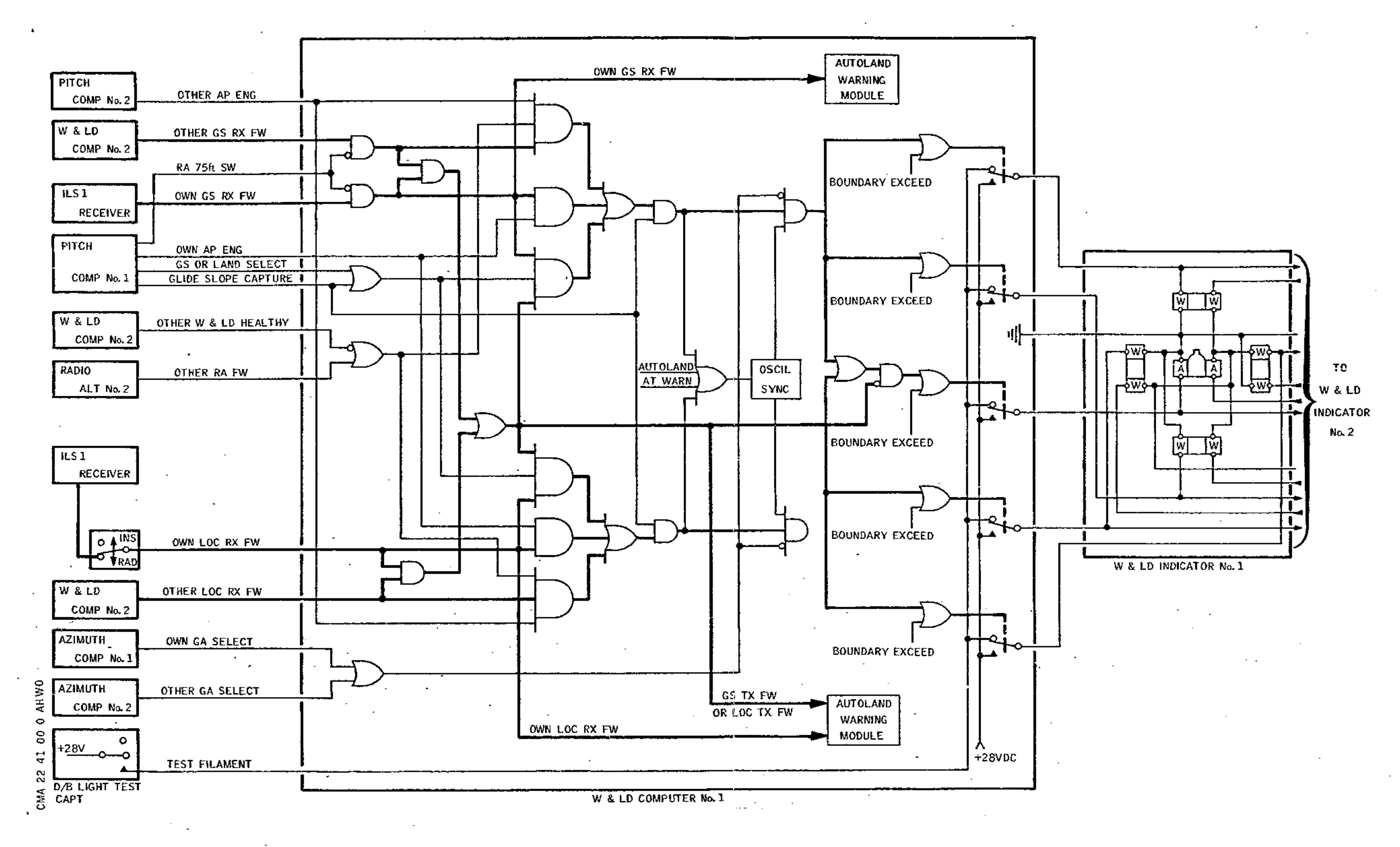
These faults are indicated on both W & LD indicators by the beam deviation bars corresponding to the faulty receiver and the aircraft symbol flashing.

NOTE : The W & LD indicator also indicates faults in the ILS receiver of the other side if the other AP is engaged and the radio altimeter or the W & LD system of the other side is faulty.

ILS receiver fault indications stop if the fault disappears, if a GO AROUND is initiated or if the associated AP is disconnected.

NOTE : If a receiver fault occurs below 600 ft,

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ILS Fault Module
Figure 008

the associated AP disconnects and the receiver fault indication is suppressed.

(c) Transmitter fault (double receiver fault) indicating (***//AHWO//***)

These faults are taken into consideration from glide slope capture (GSC) whatever the AP engagement status.
GLIDE transmitter faults have no effect below 75ft.

Faults are indicated on both W & LD indicators by the deviation bars corresponding to the faulty transmitter flashing. Unlike receiver fault indicating, the aircraft symbol does not flash.

ILS transmitter fault indications stop if the fault disappears or if a GO AROUND is initiated.

(5) LAND 2 and LAND 3 capability indication modules (Ref. Fig. 009)

Each module receives logic signals issued by systems and peripherals associated with landing and controls illumination of LAND 2 and LAND 3 caption lights.

Capability indications are displayed as soon as LAND mode is selected, provided a LOC frequency has been selected on the associated VOR-ILS-DME control unit.

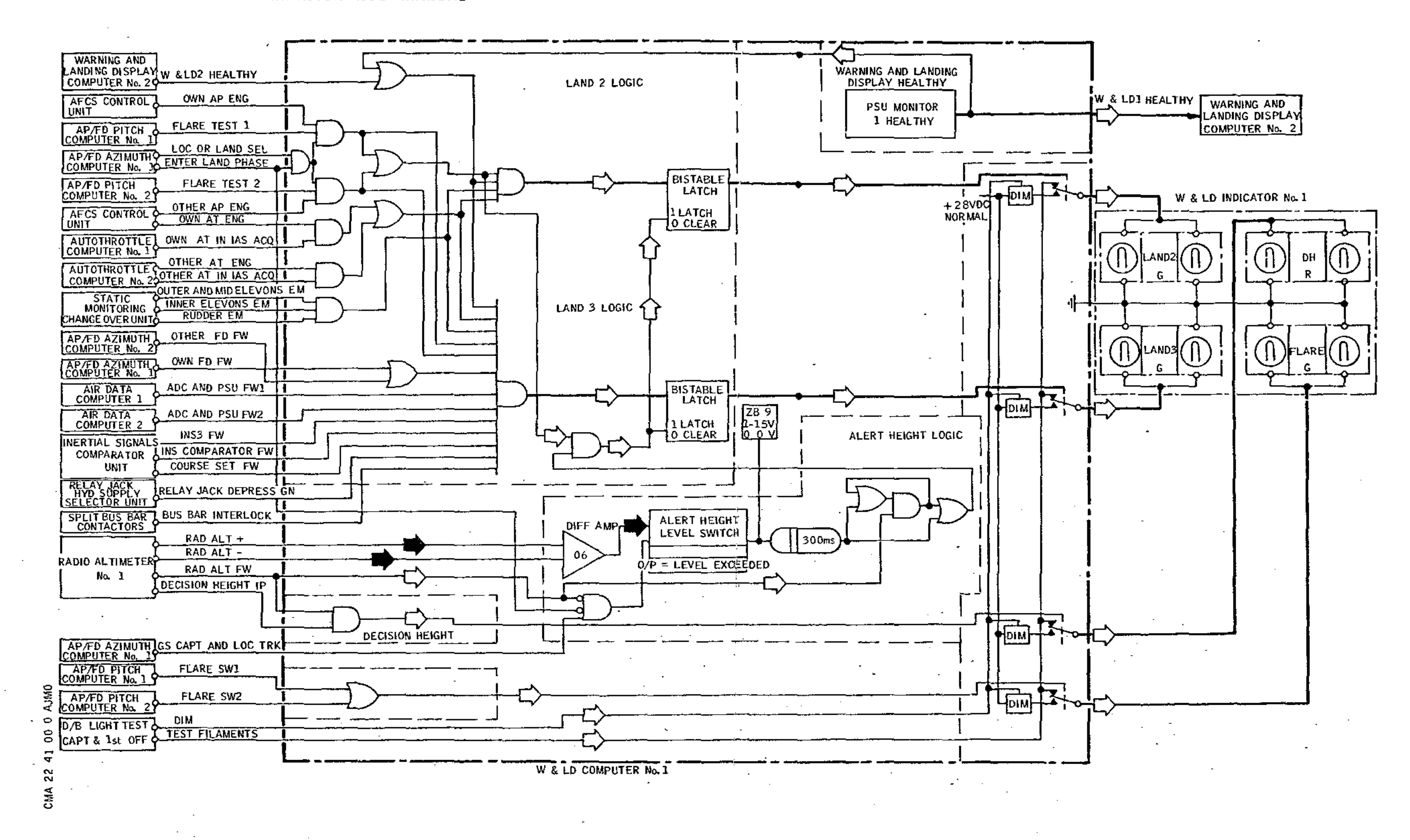
(a) Logic conditions necessary to cause LAND 2 caption light to come on are the following :

- One AP channel engaged in LAND mode and flare test correct
- At least one W & LD computer healthy
- All elevon and rudder control surfaces in electrical mode
- At least one autothrottle channel engaged in IAS ACQ mode.

(b) Logic conditions necessary to cause LAND 3 and LAND 2 caption lights to come on are the following :

- At least one W & LD computer healthy
- At least one autothrottle channel engaged in IAS ACQ mode
- All elevon and rudder control surfaces in electrical mode

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LAND 2, LAND 3, DH and F Indication Modules
Figure 009

R - 2 AP channels in LAND mode and flare test
R correct
R - At least one FD channel engaged
- 2 ADCs healthy
- INS 3 healthy
- ISCU healthy
- Comparison of runway headings (COURSE SET)
R selected on the AFCS control unit correct
(VOR/LOC knob).
R - Green or Yellow hydraulic supply of relay
R jacks available
- Split power supplies.

(c) Additional information

R (c1) During flare test (carried out in the AP/FD pitch computers), the capability indications (LAND 2 and LAND 3) remain illuminated.
R On failure detection, LAND 3 caption light
R goes off.

Below the alert height (AH), which is 300 feet, capability indications are locked (except in the case of loss of both APs).

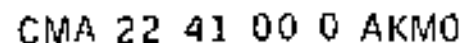
(c2) Course setting comparison (Ref. Fig. 010)

R The inertial signals comparator unit (ISCU) compares the data from both heading selector switches. If the discrepancy between the two
R runway headings selected exceeds 3 deg. 51
R minutes, the ISCU sends a + 15 V signal (-15V healthy) to the W & LD computers which results in the loss of LAND 3 capability, and to the AP/FD azimuth computers, which results in the loss of the decrab function.
When COMP 1/COMP 2 switches are not placed in the position corresponding to their respective side, the heading deviation signal is
R not sent to the ISCU. In such a case, ISCU comparison will result in the loss of LAND 3 capability and decrab function.

(6) DH caption light module (Ref. Fig. 009)

This module receives signals from the associated radio
R altimeter and causes the DH caption light to come on.

R This caption light comes on as soon as the aircraft reaches the altitude pre-selected on the associated



AZIMUTH COMPUTER No. 1
W & LD COMPUTER No. 1
COURSE SET FW
ISCU
COURSE SET FW
AZIMUTH COMPUTER No. 2
W & LD COMPUTER No. 2
COMPASS COUPLER No. 1
CAP MAG 5
CAP MAG 8
CAP MAG 5
CAP MAG 8
COMPASS COUPLER No. 2
COMP 1
COMP 2
COMP 1
COMP 2
HSI No. 1
HSI No. 2
CDX
CDX
AFCS CONTROL UNIT
1 VOR LOC
REF
2 VOR LOC
REF

ISCU Course Setting Monitoring
Figure 010

EFFECTIVITY: ALL

R BA

radio altimeter, whatever the engagement status of the AP and the FD.

This caption light goes off when a height of 0 ft is displayed on the radio altimeter.

(7) "F" caption light module (Ref. Fig. 009)

This module receives flare phase trigger signals from the two AP/FD pitch computers.

B However, the Flare light is disconnected by Mod CM
B 42513.

(8) AUTOLAND warning light module (Ref. Fig. 011)

This module receives excessive beam deviation and ILS fault information, autothrottle fault information and information on IAS comparison between the two ADCs. Depending on the altitude at which a fault occurs it can cause the two AUTOLAND warning lights to come on if at least one AP is engaged.

The two AUTOLAND warning lights flash for one of the following conditions :

(a) Approach in GLIDE mode

(a1) Total loss of autothrottle below 600 ft.

(a2) IAS comparison between the two ADCs incorrect below 600 ft.

(a3) GLIDE transmitter fault between 200 ft. and 75 ft.

(a4) LOC transmitter fault below 200 ft.

(b) Approach in LAND mode

(b1) Excessive LOC deviation below 200 ft.

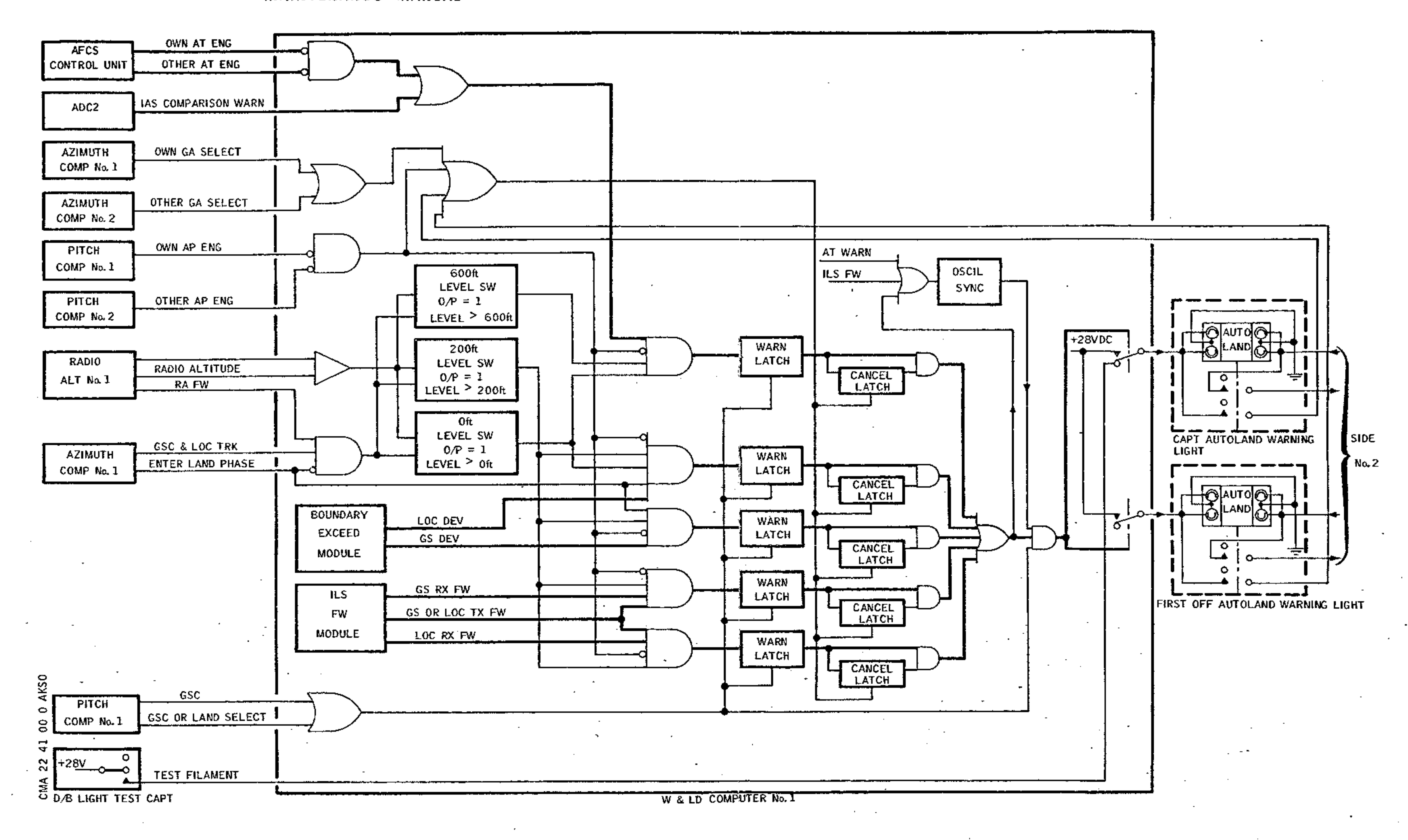
(b2) Excessive GLIDE deviation between 200 and 100 ft.

(b3) Conditions listed for GLIDE mode.

The AUTOLAND warning lights remain illuminated even if the cause of the fault disappears

The AUTOLAND warning lights go off in one

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AUTOLAND Warning Light Module
Figure 011

of the following three cases :

- One of the AUTOLAND warning lights pressed
- GO AROUND initiated
- Total loss of AP (both APs disengaged)

(9) FD bar removal logic module (Ref. Fig. 012)

The analog FD bar control signals generated in the AP/FD computers pass through the W & LD computers. If an ILS receiver fault occurs in automatic approach the W & LD computers cause removal of the FD bar associated with the faulty receiver. The FD bar removal conditions are as follows :

(a) Pitch bar

On a GLIDE receiver fault, after GLIDE SLOPE CAPTURE and LOC TRACK and above 75 ft. as long as approach is carried out in LAND mode.
The bar re-appears if a GO AROUND is initiated.

(b) Roll bar

On a LOC receiver fault, after GLIDE SLOPE CAPTURE and LOC TRACK, as long as approach is carried out in LAND mode.
The bar re-appears if a GO AROUND is initiated.

(c) Yaw pointer

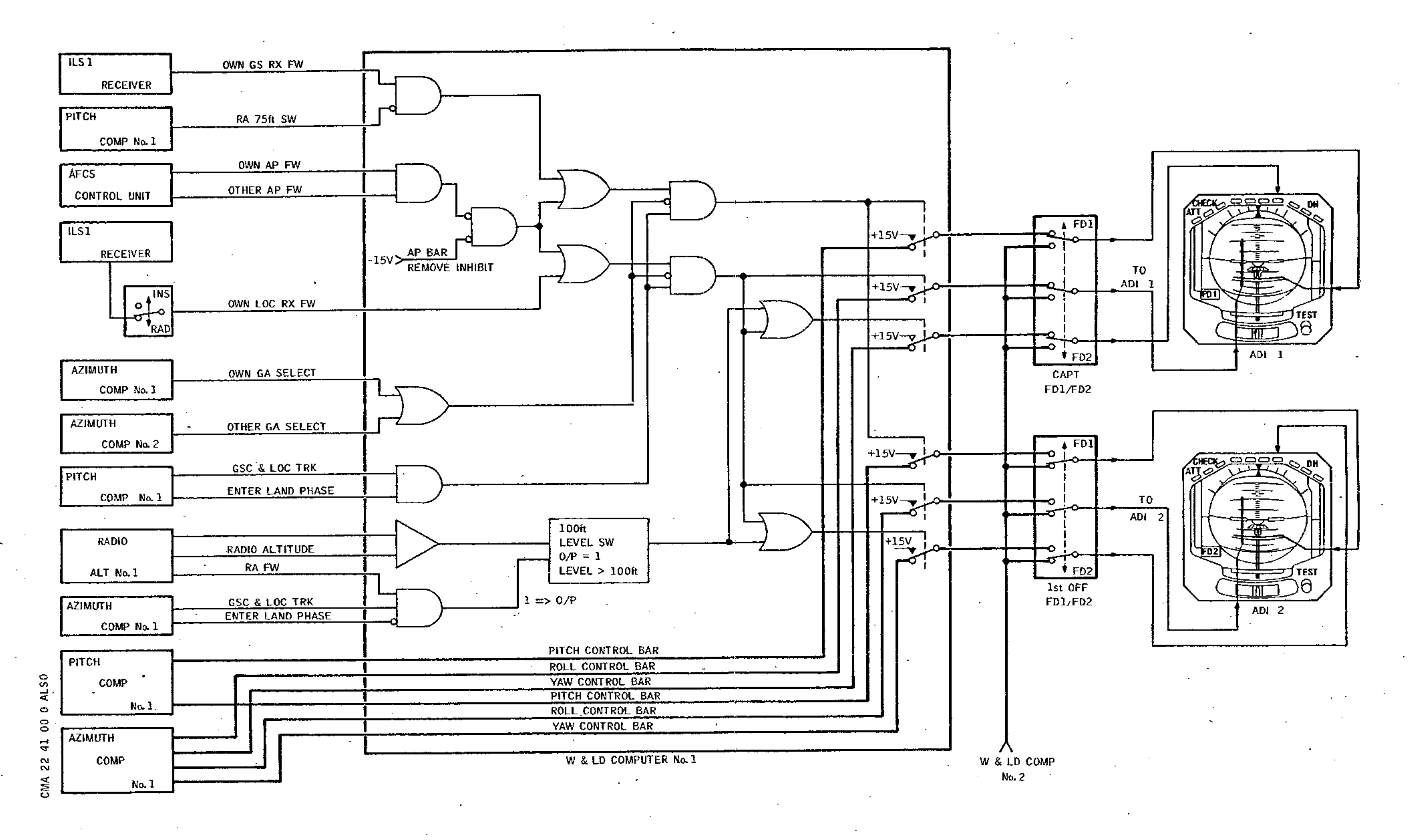
The yaw pointer is removed by the W & LD computer above a height of 100 ft. It is also removed in the same conditions as the roll bar.

Even if the W & LD computer authorizes the yaw pointer to appear, in fact it will only appear on disengagement of both APs (FD only engaged) when the RUNWAY GUIDANCE phase is active in the AP/FD azimuth computer (Ref. 22-13-00, Description and Operation, paragraph 5.G. (6)).

(10) AP/FD disconnect module
(Ref. Fig. 013)

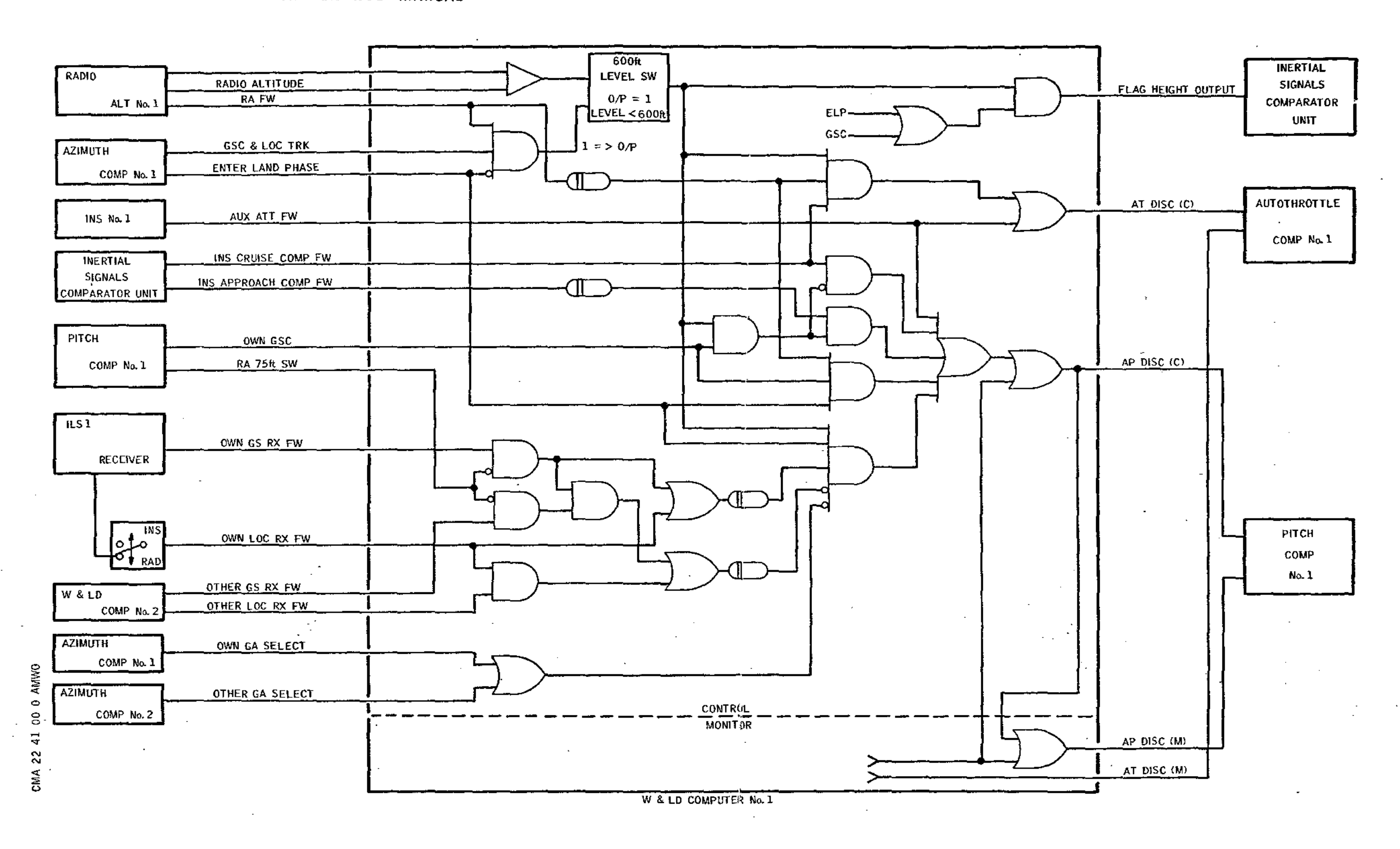
The AP/FD and AT disconnect logic circuit-boards are duplicated. (Control channel and monitoring channel).

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R

FD Bar Removal Logic Module
Figure 012



AP/FD Disconnect Logic
Figure 013

The disconnection conditions depend on the flight phase

(a) In cruise flight, there are two disconnection conditions :

(a1) Self-detected INS failure (AUX ATT FW signal).

This signal results in disconnection of the associated AP/FD at any altitude.

(a2) INS failure detected through ISCU cruise comparison. The ISCU monitors the pitch and roll attitudes from the 3 INS and causes the disconnection of the AP/FD associated with the INS which is considered faulty (threshold : 4°54'), when altitude is more than 600 ft.

These INS failures occuring during cruise flight are not stored by the ISCU and the disconnection of both APs/FDs may occur.

(b) In approach flight, there are four disconnection configurations :

(b1) INS self-detected failure

(b2) INS failure detected through ISCU approach comparison. The ISCU receives a logic signal (FLAG HEIGHT OUTPUT) from the W & LD system, which initiates approach comparison when height on radio altimeter is less than 600 ft and when LAND mode is selected or after glide slope capture.

It monitors the roll and pitch attitudes (threshold : 2°27') from the 3 INS, the magnetic heading variations (threshold : 3°51') between compass computer No.1 and compass computer No.2 and the vertical acceleration (threshold : 0.047 g) from the 3 INS.

The first failure of an INS causes the associated AP/FD to disconnect.

These failures are stored and disconnection depends on the first failure only (no disconnection of both APs through the ISCU).

(b3) Radio altimeter failure after glide slope capture in LAND mode.

(b4) ILS receiver fault in LAND mode ; only between 600 ft and the ground for a LOC receiver and between 600 ft and 75 ft. for a GLIDE receiver.

The AP/FD does not disconnect for an ILS transmitter fault.
An ILS receiver fault has no effect following initiation of a GO AROUND.

(11) AT disconnection module (Ref. Fig. 013)

The AT disconnection logic circuits are duplicated (control channel and monitoring channel).
Each W & LD computer causes AT disconnection for the following circumstances :

(a) Self-detected INS failure (AUX ATT FW) at any altitude.

(b) INS failure detected by ISCU cruise comparison below 600 ft.

6. Operation

Automatic landing control varies with the selected approach modes.

A. LAND Mode
(Ref. Fig. 014)

(1) Upon selection of LAND mode, the following systems should already be engaged :

- The 2 autothrottles
- Both FDs
- One autopilot, in HDG HOLD and ALT HOLD modes for instance.

(2) In order to prepare ILS beam capture, the pilot selects the heading for ILS beam capture, LOC frequency, runway heading, approach speed and engages the autothrottle IAS ACQ mode and the AP/FD TRK HDG mode.

(3) When the ILS beams are detected, (ILS flags disappear from both HSIs and ADIs), the pilot selects LAND mode. As soon as this mode is selected :

(a) On AFCS control unit, the prime indicator lights associated with LAND, VOR/LOC and GLIDE modes come on.

(b) Beam deviation indicators and capability caption lights are operative.

- One LOC deviation bar and one GLIDE deviation bar as well as the aircraft symbol illuminate to show the aircraft position with reference to the ILS beams
- LAND 2 capability is displayed.

(c) The pilot engages the second AP and, if Captain side and First Officer side are supplied separately, LAND 3 capability caption light comes on.

(d) The pilot selects the minimum decision height on the radio altimeter indicators.

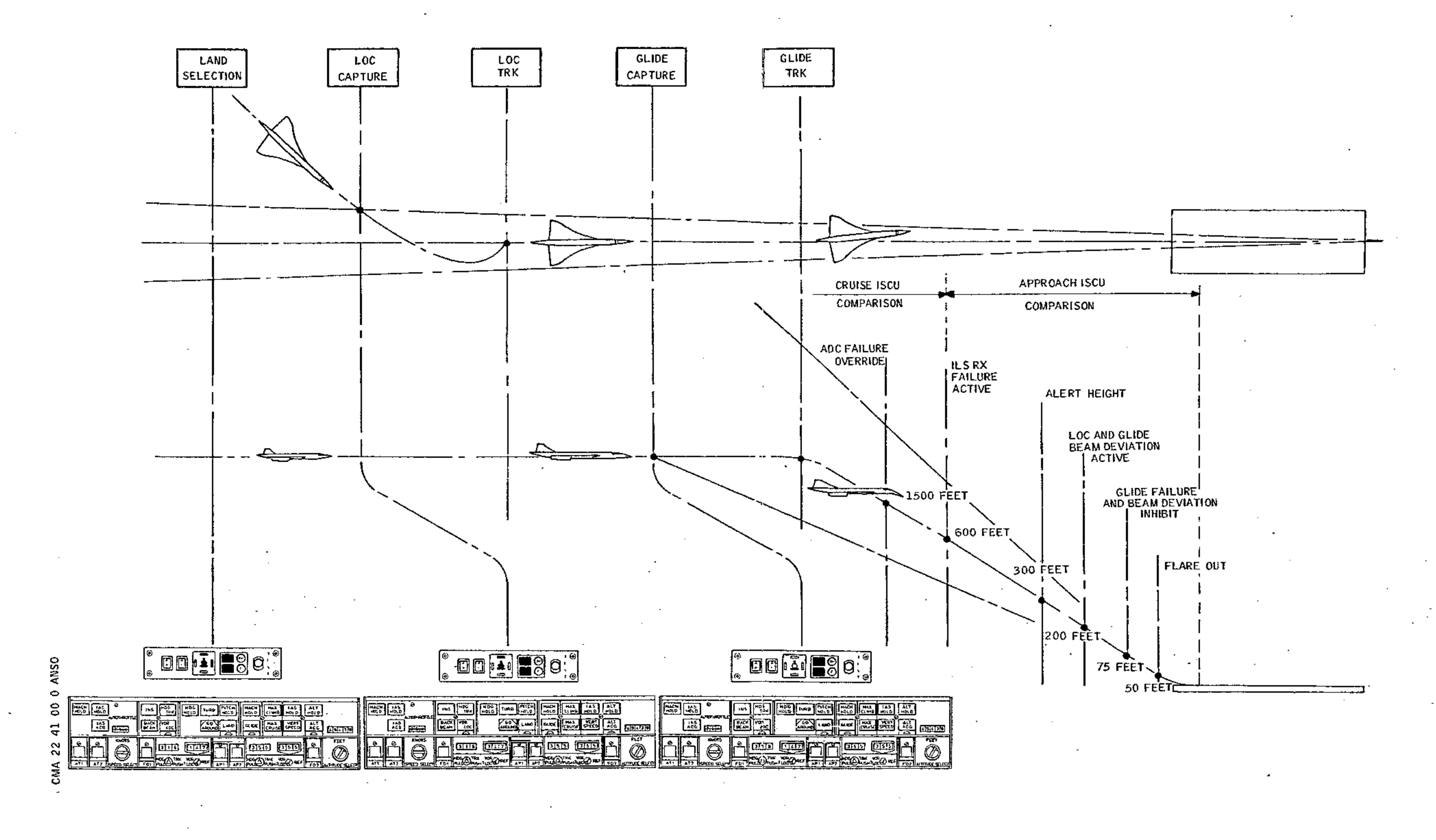
(4) LOC beam capture is displayed to the pilot by :

(a) VOR/LOC prime indicator light going off and VOR/LOC mode selection push-button illuminating.

(b) LOC beam deviation bar extinguishing as soon

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R Various Phases of Automatic Landing
Figure 014

R as the deviation is lower than the threshold.

(5) In order to check that AP2 is controlling the aircraft the Captain disengages AP1 (capability reduction) :

After carrying out this check, the Captain re-engages
R AP1.

(6) GLIDE beam capture is displayed to the pilot through :

R (a) Prime caption lights associated with GLIDE and
R LAND modes going off and LAND push-button illu-
R minating.

R (b) GLIDE beam deviation bar extinguishing as soon as
R the deviation is lower than the threshold.

R (7) LAND mode being active :

R (a) The circuits generating the flare law are tested automatically (delay : 20 seconds approximately). At the end of test, the F green caption lights
R come on for 2 seconds.

If the flare circuit associated with one or both APs has been detected defective, the landing capability is reduced. LAND 3 caption light
R goes off when only one AP is involved, LAND
R 2 and LAND 3 caption lights go off when both are involved).

(b) The GO AROUND mode becomes active when a pilot pushes the throttle control levers to the maxi-
R mum thrust stops and disengages the autothrottle system.

(c) The radio altimeter flag is active and can cause the associated AP/FD to disengage.

R (8) At 1500 feet, the ADC flag is inhibited. Therefore the
R AP can be engaged below 1500 ft if the associated ADC fails.

R (9) Down to 600 feet, the ISCU is in cruise monitoring.

R (10) Below 600 feet, validity signals from the ILS recei-
R vers become active. The AP/FD comparator thresholds
R are decreased and ISCU approach monitoring becomes
R active, replacing cruise monitoring.

(11) When the alert height, currently at 300 feet, is reached, the pilot checks that the LAND 2 and LAND 3 capability caption lights are illuminated.
Below this height, loss of a system associated with landing does not involve any capability reduction if at least one AP remains engaged.

(12) At 200 feet, beam deviation will cause both AUTOLAND red warning lights to flash (loss of automatic landing).
If the pilot considers visibility is too poor, he can choose a GO AROUND procedure.

(13) At 75 feet, GLIDE beam deviations and failures are inhibited, only LOC beam deviations and failures are active down to the ground and result in both AUTOLAND warning lights coming on (LOC failures result also in AP disconnection).

(14) At decision height, the DH caption light comes on on both W & LD indicators.

(15) At 50 feet, the FLARE phase is automatically initiated in the AP/FD computers.

(16) At an altitude below 30 feet, the decrab phase is automatically initiated in the AP/FD computers.

(17) At touch-down, both APs must be disengaged and nose wheel touch-down is controlled by the pilot.
Runway guidance can be carried out using the yaw pointers on the two ADIs if at least one FD is engaged.

B. GLIDE mode

(1) Unlike the LAND mode, the GLIDE mode is not associated with the radio altimeter and the radio altimeter flag cannot cause AP/FD disengagement.

(2) The capability caption lights are inhibited.

(3) Below 600 feet, ILS failures cannot cause AP disengagement.
They result in AUTOLAND warning lights coming on when they occur below 200 feet (LOC failures) or between 200 feet and 75 feet (GLIDE failures).

(4) Below 200 feet, a LOC or GLIDE beam deviation does not activate the AUTOLAND warning.

7. Power Supply

W & LD computers are supplied with 115 VAC through an essential busbar for computer No.1 and through a sheddable busbar for computer No.2

The essential busbar 28 VDC power supply is duplicated on each computer so that, on failure of either supply, the W & LD system can initiate the main warnings.
That is, on side 1 :

A. On circuit breaker 1C192 failure, the system cannot initiate :

- The aural warning associated with the AP
- The red AT and AP warnings to the other indicator
- Capability indications
B - DH caption light illumination.

B. On circuit breaker 1C193 failure, the system cannot initiate :

- AP and AT warnings on associated indicator
- AUTOLAND warning
- Illumination of excessive beam deviation bars and aircraft symbol on W & LD indicators.

SERVICE	BUSBAR		C/B PANEL
WARN & LDG DISPLAY 1 SUP 1	"A" ESSENTIAL	3P	1-213
WARN & LDG DISPLAY 1 SUP 2	"A" ESSENTIAL	3P	1-213
LDG DISPLAY SYS 1 SUP	No.2 ESSENTIAL	6X	2-213
WARN & LDG DISPLAY 2 SUP 1	"B" ESSENTIAL	4P	5-213
WARN & LDG DISPLAY 2 SUP 2	"B" ESSENTIAL	4P	5-213
LDG DISPLAY SYS 2 SUP	"B" AVIONICS SHEDDABLE	11X	13-216

WARNING AND LANDING DISPLAY - TROUBLE SHOOTING

WARNING : OBSERVE THE ELECTRICAL SAFETY PRECAUTIONS DESCRIBED IN 24-00-00, SERVICING.

1. General

The following trouble shooting procedures are intended to enable faults found in the Warning and Landing Display system to be quickly rectified.

R The Warning and Landing Display system consists of two lanes.
R As a rule, procedures are described for lane 1 while infor-
R mation for lane 2 is given between parentheses.

The defect can be isolated first through a preliminary check of
R the lights, then through a check of the computer of the faulty
R lane by means of the ITEM system (Ref. 22-41-00, Adjustment/
Test, Operational Test paragraph 2D), finally through the
procedure specific to each function. The defect is traced
R through OK and NOT OK paths to the appropriate charts or other
specified rectification action as may be necessary. If a defect
occurs, perform the appropriate rectification action, then
repeat the operation at which the defect was encountered to
ensure the operation is OK.

Bracketed numbers in the procedures and charts indicate items on the component identification table (Ref. Table 101). The table provides information including component location required for rectification.

All procedures dealing with trouble shooting are based on the
R assumption that electrical wiring is serviceable, all associated
circuit breakers are set and electrical power is available,
unless otherwise stated. If the fault is not rectified, check
the wiring in accordance with the Wiring Diagram Manual (Ref.
Table 101).

2. Prepare

A. Equipment and Materials

DESCRIPTION	PART NO.
VOR/ILS Ground Test Unit	
Simulator-Pressure Sensors	87209455
R Radio Altimeter Ground Test Unit	

B. Check that system circuit breakers (Table 101 : Item No.5 - 6 - 9 - 10 - 11 - 12) are set.

C. Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

D. Make certain that electronics rack ventilation operates (Ref. 21-21-00).

E. Make certain that there is no incompatibility for the setting of inertial navigation systems (Ref. 34-45-00, Adjustment/Test).

F. Check that air data system can be operated (Ref. 34-11-00, Adjustment/Test).

G. Check that AP/FD system can be engaged (Ref. 22-10-00, Servicing).

H. Check that autothrottle system can be engaged (Ref. 22-31-00, Adjustment/Test).

R I. Make certain that Flight Controls can be set in Blue or
R Green electrical mode (Ref. 27-00-00, Servicing).

J. Make certain that Blue hydraulic system (Ref. 29-12-00, Servicing) and Green hydraulic system (Ref. 29-11-00, Servicing) can be pressurized.

3. Trouble Shooting

```
 **************************************************
 * Prepare system for trouble shooting as described  *
 * in paragraph 2.                                    *
 * On LH side console, place hold-to-test DB LIGHTS   *
 * TEST switch in TEST position.                      *
 * Check on Warning and Landing Display indicator     *
 * No.1 [1] that the following lights illuminate :    *
 * AP red warning light, AT red warning light,        *
 * aircraft symbol and excessive beam deviation bars  *
 * LAND 2 and LAND 3 caption lights, and DH caption   *
B* light.                                             *
 * Check on Warning and Landing Display indicator No2*
 * [2] that the following lights illuminate.          *
 * AP red warning light, AT red warning light,        *
 * aircraft symbol and excessive beam deviation bars.*
 * Check that lower parts of Captain [3] and First    *
 * Officer [4] AUTOLAND warning lights illuminate.    *
 * IF                                                 *
 **************************************************
    ||    |       ----------------------------------------------
    ||    |       | Faulty lights on Captain W & LD indicator on |
    OK    NOT OK----| test of lights.                              |
    ||            | Ref. Chart 101.                              |
    ||            ----------------------------------------------
    ||
 **************************************************
 * On RH side console, place hold-to-test DB LIGHTS   *
 * TEST switch in TEST position.                      *
 * On Warning and Landing Display indicator No.2 [2] *
 * check that the following lights illuminate :       *
 * AP red warning light, AT red warning light,        *
 * aircraft symbol and excessive beam deviation bars  *
 * LAND 2 and LAND 3 caption lights, and DH caption   *
B* light.                                             *
 * On Warning and Landing Display indicator No.1 [1],*
 * check that the following lights illuminate :       *
 * AP red warning light, AT red warning light,        *
 * aircraft symbol and excessive beam deviation bars  *
 * Check that upper part of Captain [3] and First     *
 * Officer [4] AUTOLAND warning lights illuminate. IF*
 **************************************************
    ||    |       ----------------------------------------------
    ||    |       | Faulty lights on First Officer W & LD indi-  |
    OK    NOT OK----| cator on test of lights.                     |
    ||            | Ref. Chart 101.                              |
    ||            ----------------------------------------------
```

```
   ||
   ||
*****************************************************
* On W & LD indicator No.1 [1] press TEST push      *
* button.                                           *
* On this indicator, check that the following lights*
* illuminate :                                      *
* AP red warning light, AT red warning light, air-  *
* craft symbol and LOC beam deviation bars, LAND 2  *
* and LAND 3 caption lights, and DH caption light.  *
*                                                   *
* On W & LD indicator No.2 [2], check that the      *
* following lights illuminate :                     *
* AP red warning light, AT red warning light, air-  *
* craft symbol and excessive beam deviation bars.   *
* Check that Captain [3] and F/O [4] AUTOLAND war-  *
* ning lights illuminate.                           *
* Check that cavalry charge warning associated with *
* AP system sounds for one second. IF               *
*****************************************************
    ||      |
    ||      |    ---------------------------------------------------
    ||  NOT OK--| No aural warning. On F/O indicator, AP and AT      |
    ||      |    | red warning lights do not illuminate. LAND 2 and|
    ||      |    | LAND 3 caption lights do not illuminate. DH      |
B   ||      |    | caption light does not illuminate. F/O AUTOLAND |
    ||      |    | warning light does not illuminate.               |
    ||      |    | Check 28 VDC output from circuit breaker [5].    |
    ||      |    ---------------------------------------------------
    ||      |
    ||      |    ---------------------------------------------------
    ||  NOT OK--| On Captain indicator AP and AT red warning lights|
    ||      |    | do not illuminate. Captain AUTOLAND warning light|
    ||      |    | does not illuminate. Aircraft symbol and excess- |
    ||      |    | ive deviation bars on the two indicators do not  |
    ||      |    | illuminate.                                      |
    ||      |    | Check 28 VDC output from circuit breaker [6].    |
    ||      |    ---------------------------------------------------
    ||      |
    ||      |    ---------------------------------------------------
    ||  NOT OK--| All lights on the two indicators remain extin-   |
    ||      |    | guished. Ref. Chart 102                          |
    ||      |    ---------------------------------------------------
    ||      |
    ||      |    ---------------------------------------------------
    OK  NOT OK--| In all other cases replace W & LD computer No.1  |
    ||           | [7] (No.2 [8]).                                  |
    ||           ---------------------------------------------------
```

```
    ||
    ||
*************************************************
* On W & LD indicator No.2 [2] press TEST push   *
* button.                                        *
* On this indicator, check that the following lights*
* illuminate :                                   *
* AP red warning light, AT red warning light, air-  *
* craft symbol and LOC beam deviation bars, LAND 2  *
B* and LAND 3 caption lights, and DH caption light. *
*                                                *
* On W & LD indicator No.1 [1], check that the   *
* following lights illuminate :                  *
* AP red warning light, AT red warning light, air-  *
* craft symbol and excessive beam deviation bars.   *
* Check that Captain [3] and F/O [4] AUTOLAND    *
* warning lights illuminate.                     *
* Check that cavalry charge warning associated with *
* AP system sounds for one second. IF            *
*************************************************
    ||      |
    ||      |   ------------------------------------------------
    ||   NOT OK--| No aural warning. On Captain indicator, AP and AT|
    ||      |   | red warning lights do not illuminate. LAND 2 and |
    ||      |   | LAND 3 caption lights do not illuminate. DH      |
B   ||      |   | caption light does not illuminate. Captain AUTO- |
    ||      |   | LAND warning light does not illuminate.          |
    ||      |   | Check 28 VDC output from circuit breaker [9].    |
    ||      |   ------------------------------------------------
    ||      |
    ||      |   ------------------------------------------------
    ||   NOT OK--| On F/O indicator AP and AT red warning lights do |
    ||      |   | not illuminate. F/O AUTOLAND warning light does  |
    ||      |   | not illuminate. Aircraft symbol and excessive    |
    ||      |   | deviation bars on the two indicators do not      |
    ||      |   | illuminate.                                      |
    ||      |   | Check 28 VDC output from circuit breaker [10].   |
    ||      |   ------------------------------------------------
    ||      |
    ||      |   ------------------------------------------------
    ||   NOT OK--| All lights on the two indicators remain extin-   |
    ||      |   | guished. Ref. Chart 102.                         |
    ||      |   ------------------------------------------------
    ||      |
    ||      |   ------------------------------------------------
    OK   NOT OK--| In all other cases replace W & LD computer No.2  |
    ||          | [8] (No.1 [7]).                                  |
    ||          ------------------------------------------------
    ||
    ||
```


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```
   ||
   ||
*****************************************************
* By means of ITEM system, carry out check of       *
* Warning and Landing Display computer No.1 (No.2). *
* Display data. IF                                  *
*****************************************************
   ||        |
WLD||PASS    |
   ||     WLD|COMP
   ||        |    ----------------------------------------------------
   OK     NOT OK--| Replace W & LD computer No.1 [7] (No.2 [8]).     |
   ||             ----------------------------------------------------
*****************************************************
* If defect encountered has not been rectified      *
* through this preliminary check, carry out trouble *
* shooting procedure specific to function concerned.*
* IF                                                *
*****************************************************
        |
        |
```

```
|
NOT OK----| AT failure warning                                  |
|
NOT OK----| AP failure warning                                  |
|
NOT OK----| LAND 2 - LAND 3 landing capability indication       |
|
NOT OK----| DH Decision Height indication                       |
|
|
NOT OK----| Excessive beam deviation warning                    |
|
NOT OK----| ILS failure warning                                 |
|
NOT OK----| AUTOLAND failure warning                            |
|
NOT OK----| AP/AT Interlocks                                    |
```


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```
AT Failure Warning
*****************************************************
* Trip circuit breaker [9] ([5]).                   *
* On AFCS control unit [13], make certain that      *
* both switches AT1 and AT2 are not engaged.        *
* On both Warning and Landing Display indicators [1]*
* [2], check if both AT warning lights are flashing.*
* IF                                                *
*****************************************************
    ||    |        -------------------------------------------------
    ||    |       | No flashing of AT warning lights, with          |
    OK    NOT OK----| autothrottle system not engaged.                |
    ||            | Ref. Chart 103.                                 |
    ||             -------------------------------------------------
*****************************************************
* Engage AT1 switch. Check that both AT warning     *
* lights extinguish. IF                             *
*****************************************************
    ||    |        -------------------------------------------------
    ||    |       | No cancellation of AT warning on engagement     |
    OK    NOT OK----| of AT1 switch, with AT2 not engaged.            |
    ||            | Replace W & LD computer No.1 [7] (No.2 [8]).    |
    ||             -------------------------------------------------
*****************************************************
* Disengage AT1 switch then engage AT2 switch.      *
* Check that both AT warning lights re-extinguish.IF*
*****************************************************
    ||    |
    ||    |        -------------------------------------------------
    ||    |       | No cancellation of AT warning on engagement     |
    OK    NOT OK----| of AT2 switch, with AT1 not engaged.            |
    ||            | Ref. Chart 104.                                 |
    ||             -------------------------------------------------
*****************************************************
* On throttle control lever No.1, press then release*
* AT instinctive disconnect push-button [15]. Check *
* that AT2 switch returns to OFF. Press again then  *
* release instinctive disconnect push-button.       *
* Check that both AT warning lights extinguish. IF  *
*****************************************************
    ||    |        -------------------------------------------------
    ||    |       | No cancellation of AT warning on operation of   |
    OK    NOT OK----| throttle control lever No.1, at disconnect      |
    ||            | push-button.                                    |
    ||            | Ref. Chart 105.                                 |
    ||             -------------------------------------------------
```

```
   ||
*****************************************************
* Engage AT1 switch. On throttle control lever No.4,*
* press then release instinctive disconnect push-   *
* button. Check that AT1 switch returns to OFF      *
* position. Press again then release instinctive    *
* disconnect push-button. Check that both AT warning*
* lights extinguish. IF                             *
*****************************************************
   ||    |
   ||    |     --------------------------------------------------
   OK   NOT OK----| No cancellation of AT warning following action |
   ||             | on AT instinctive disconnect push-button on   |
   ||             | throttle control lever No.4.                   |
   ||             | Replace instinctive disconnect push-button [16]|
   ||              --------------------------------------------------
*****************************************************
* Operate then disengage AT1 switch in order to     *
* trigger warning of both AT warning lights.        *
* On Warning and Landing Display indicator No.1 [1],*
* press then release AT warning light.              *
* Check that both AT warning lights extinguish. IF  *
*****************************************************
   ||    |
   ||    |     --------------------------------------------------
   OK   NOT OK----| No cancellation of AT warning following action |
   ||             | on Captain W & LD indicator AT warning light.  |
   ||             | Ref. Chart 106.                                |
   ||              --------------------------------------------------
*****************************************************
* Operate then disengage AT1 switch in order to     *
* trigger warning of both AT warning lights.        *
* On Warning and Landing Display indicator No.2 [2],*
* press then release AT warning light.              *
* Check that both AT warning lights extinguish. IF  *
*****************************************************
   ||    |
   ||    |     --------------------------------------------------
   OK   NOT OK----| No cancellation of AT warning following action |
   ||             | on First Officer W & LD indicator AT warning   |
   ||             | light.                                         |
   ||             | Ref. Chart 107.                                |
   ||              --------------------------------------------------
   ||
   ||
   ||
   ||
   ||
```

```
   ||
   ||
*****************************************************
* On AFCS control unit [13], operate AP1 switch,    *
* select GLIDE mode, check that associated prime    *
* indicator light illuminates.                      *
* By means of VOR/ILS ground test unit, carry out   *
* GLIDE beam capture. GLIDE selection push-button   *
* illuminates.                                      *
* Check that both AT warning lights are flashing. IF*
*****************************************************
   ||    |         ------------------------------------------------------
   ||    |        | No AT warning light on capture of GLIDE beam,      |
   OK    NOT OK----| with AP No.1 engaged and AT system not engaged.|
   ||             | Ref. Chart 108.                                    |
   ||              ------------------------------------------------------
*****************************************************
* Place at least two throttle control levers in     *
* maximum thrust position : GO AROUND mode selection*
* push-button illuminates.                          *
* Check that both AT warning lights extinguish. IF  *
*****************************************************
   ||    |         ------------------------------------------------------
   ||    |        | No cancellation of AT warning light                |
   OK    NOT OK----| in GO AROUND, after GLIDE capture, AP No.1         |
   ||             | engaged, and AT system not engaged.                |
   ||             | Ref. Chart 109.                                    |
   ||              ------------------------------------------------------
*****************************************************
* Bring previously mentioned throttle control levers*
* back to full idle position.                       *
* Disengage AP1 switch, then engage AP2 switch.     *
* Select GLIDE mode then carry out another GLIDE    *
* beam capture.                                     *
* GLIDE mode selection push-button illuminates.     *
* Check that both AT warning lights are flashing. IF*
*****************************************************
   ||    |         ------------------------------------------------------
   ||    |        | No AT warning on GLIDE beam capture.               |
   OK    NOT OK----| AP No.2 engaged and AT system not engaged.         |
   ||             | Ref. Chart 110.                                    |
   ||              ------------------------------------------------------
   ||
   ||
   ||
   ||
   ||
   ||
```

```
   ||
****************************************************
* Place at least two throttle control levers       *
* in maximum thrust position. GO AROUND mode       *
* selection push-button illuminates.               *
* Check that both AT warning lights extinguish. IF *
****************************************************
    ||    |
    ||    |          --------------------------------------------------
    OK    NOT OK----| No cancellation of AT warning in GO AROUND       |
    ||              | mode, after GLIDE capture, with AP No.2          |
    ||              | engaged and Autothrottle system not engaged.    |
    ||              | Ref. Chart 111.                                  |
    ||               --------------------------------------------------
    ||
****************************************************
* Disengage AP2 switch. On ADC control panel, place *
* ADC1 and ADC2 switches in OFF position.          *
* On shelf 6-215, remove ADC1 panel ES-215, if     *
* necessary. Connect pressure sensor simulator to  *
* ADC1 front face test connector. Place ADC1 switch *
* in ON position, press ADC1 caption light to reset.*
* Place the four throttle control levers in mid-way *
* position.                                        *
* On AFCS control unit, display an altitude of     *
* 5000 feet. On simulator, set ALTITUDE fine       *
* potentiometer to zero, then, by means of ALTITUDE *
* coarse potentiometer, display an altitude of     *
* 4000 feet.                                       *
* Operate FD1 switch. Select ALT ACQ mode.         *
* Then, act very slowly on the fine potentiometer  *
* to bring altitude from 4000 feet to 5000 feet    *
* in a delay exceeding 30 seconds.                 *
* During this operation, the flashing of both      *
* AT warning lights must be noticed. IF            *
****************************************************
    ||    |
    ||    |          --------------------------------------------------
    ||    |         | No AT warning in ALT ACQ phase, with             |
    OK    NOT OK----| FD1 engaged and AT system not engaged.           |
    ||              | Ref. Chart 112.                                  |
    ||               --------------------------------------------------
    ||
    ||
```

```
   ||
*****************************************************
* Disengage FD1 switch, Place ADC1 switch in OFF    *
* position. On shelf 6-216, remove ADC2 panel       *
* ES-216 if necessary. Reset ALTITUDE fine and      *
* coarse potentiometers to zero, then connect       *
* simulator to ADC2 front face test connector.      *
* Repeat above procedure with ADC2 and FD2 engaged. *
* During this operation, the flashing of both       *
* AT warning lights must be noticed. IF             *
*****************************************************
   ||   |
   ||   |         ------------------------------------------------
   ||   |         | No AT warning in ALT ACQ phase, with         |
   OK   NOT OK----| FD2 engaged and AT system not engaged.       |
   ||             | Ref. Chart 113.                              |
   ||             ------------------------------------------------
*****************************************************
* AT failure warning function is correct on channel *
* 2. IF                                             *
*****************************************************
    ||   |
    ||   |        ------------------------------------------------
    ||   |        | Repeat procedure with channel No.2, referring |
    OK  NOT OK----| to information in parentheses.                |
    ||            ------------------------------------------------
*****************************************************
* Restore systems to initial condition.             *
*****************************************************
```

```
AP Failure Warning
*****************************************************
* Trip circuit breaker [9] ([5]).                   *
* On AFCS control unit [13], make certain that      *
* AP1 and AP2 switches are not engaged.             *
* On each Warning and Landing Display indicator     *
* [1], [2], check that AP warning light is          *
* illuminated. IF                                   *
*****************************************************
   ||    |           --------------------------------------------------
   ||    |          | No illumination of AP warning lights, with       |
   OK    NOT OK----| AP/FD system not engaged.                        |
   ||               | Ref. Chart 114.                                  |
   ||                --------------------------------------------------
*****************************************************
* Engage AP1 switch. Check that both AP warning     *
* lights extinguish. IF                             *
*****************************************************
   ||    |           --------------------------------------------------
   ||    |          | No cancellation of AP warning on engagement      |
   OK    NOT OK----| of AP1 switch, AP2 switch not engaged.           |
   ||               | Replace W & LD computer No.1 [7] (No.2 [8]).     |
   ||                --------------------------------------------------
*****************************************************
* Disengage AP1 switch, then engage AP2 switch.     *
* Check that both AP warning lights extinguish      *
* again. IF                                         *
*****************************************************
   ||    |           --------------------------------------------------
   ||    |          | No cancellation of AP warning on engagement of   |
   OK    NOT OK----| AP2 switch, with AP1 switch not engaged.         |
   ||               | Replace W & LD computer No.1 [7] (No.2 [8]).     |
   ||                --------------------------------------------------
*****************************************************
* On Captain control column handwheel, press then   *
* release A/P DISC switch. Check that AP2 switch    *
* returns to OFF position while cavalry charge      *
* aural warning sounds. IF                          *
*****************************************************
   ||    |           --------------------------------------------------
   OK    NOT OK----| No aural warning on AP disengagement.            |
   ||               | Ref. Chart 115.                                  |
   ||                --------------------------------------------------
   ||
```

```
   ||
*****************************************************
* Press a second time then release A/P DISC switch  *
* on Captain control column handwheel.              *
* Check that both AP warning lights extinguish. IF  *
*****************************************************
   ||    |
   ||    |    ---------------------------------------------------
   OK    NOT OK----| No cancellation of AP warning following action |
   ||              | on Captain instinctive disconnect switch.      |
   ||              | Ref. Chart 116.                                |
   ||              ---------------------------------------------------
   ||
*****************************************************
* Engage AP1 (AP2) switch.                          *
* On F/O control column handwheel, press then re-   *
* lease A/P DISC switch. Check that AP1 (AP2) switch*
* returns to OFF position while cavalry charge aural*
* warning sounds. Press a second time then release  *
* F/O A/P DISC switch.                              *
* Check that both AP warning lights extinguish. IF  *
*****************************************************
   ||    |
   ||    |         ---------------------------------------------------
   OK    NOT OK====| No cancellation of AP warning on operation of  |
   ||              | F/O A/P DISC switch.                           |
   ||              | Replace instinctive disconnect switch contact  |
   ||              | [24] ([25]).                                   |
   ||              ---------------------------------------------------
   ||
*****************************************************
* Engage then disengage AP1 (AP2) switch in order to*
* trigger AP warning.                               *
* On Warning and Landing Display indicator No.1 [1] *
* press then release AP warning light.              *
* Check that both AP warning lights extinguish. IF  *
*****************************************************
   ||    |
   ||    |         ---------------------------------------------------
   ||    |         | No cancellation of AP warning following action |
   OK    NOT OK----| on Captain W & LD indicator AP warning light.  |
   ||              | Ref. Chart 117.                                |
   ||              ---------------------------------------------------
   ||
   ||
   ||
   ||
   ||
   ||
```

```
    ||
    ||
*****************************************************
* Engage then disengage AP1 (AP2) switch to trigger *
* AP warning.                                       *
* On Warning and Landing Display indicator No.2 [2],*
* press then release AP warning light.              *
* Check that both AP warning lights extinguish. IF  *
*****************************************************
    ||    |          ---------------------------------------------------
    ||    |         | No cancellation of AP warning following           |
    OK    NOT OK----| action on F/O W & LD indicator AP warning         |
    ||              | light.                                            |
    ||              | Ref. Chart 118.                                   |
    ||               ---------------------------------------------------
    ||
*****************************************************
* AP failure warning function is correct            *
* on lane 2. IF                                     *
*****************************************************
     ||   |
     ||   |          ---------------------------------------------------
     OK   NOT OK----| Repeat procedure with lane 2, referring to        |
     ||             | information in parentheses.                       |
     ||              ---------------------------------------------------
     ||
*****************************************************
* Restore systems to initial condition.             *
*****************************************************
```

```
LAND 2 - LAND 3 Capability Indication
*****************************************************
*                                                   *
* Place the three MSU mode selectors in ALIGN       *
* position to energize the three INS's.             *
* Place ADC1 and ADC2 TEST selector switches in NORM*
* position and ADC1 and ADC2 switches in ON position*
* then reset.                                       *
* Pressurize Blue and Green hydraulic systems. Set  *
* Flight Controls in Blue electrical mode.          *
* Connect radio altimeter ground test unit to radio *
* altimeter No.1 [26] (No.2 [27]), then simulate    *
* a radio altitude of 1600 feet.                    *
* Engage AP1 switch, select LAND mode, then engage  *
* AP2 switch. Engage FD1 switch.                    *
* On KNOTS counter, display a speed of 140Kts.      *
* The four throttle control levers being in mid-way *
* position, engage AT1 (AT2), then select IAS ACQ   *
* mode : the four throttle control levers move      *
* towards the max thrust position.                  *
* Check that both VOR/LOC counters are set to the   *
* same value.                                       *
* On Captain and on F/O instrument panels place     *
* COMP1/COMP2 selector switches respectively in     *
* COMP1 and in COMP2 positions.                     *
* On both HIS's, check that the value shown is      *
* identical with the value displayed on the         *
* VOR-LOC counters.                                 *
* On ZA test socket of W & LD No.1 [7] (No.2 [8])   *
* computer front face, connect pin 28 with pin 1    *
* Check on W & LD indicator No.1 [1] (No.2 [2]) that*
* LAND 3 caption light is illuminated. IF           *
*****************************************************
    ||   |
    ||   |     ------------------------------------------------
    ||   |     | On Captain (F/O) W & LD indicator, no illumi- |
    OK   NOT OK----| nation of LAND 3 caption light with FD 1 and  |
    ||         | AT 1 engaged.                                  |
    ||         | Ref. Chart 119.                                |
    ||         ------------------------------------------------
    ||
    ||
```

```
    ||
    ||
*************************************************
* Disengage FD1 switch, then engage FD2 switch.   *
* On W & LD indicator No.1 [1] (No.2 [2]),         *
* LAND 3 caption light is illuminated. IF          *
*************************************************
    ||   |
    ||   |      --------------------------------------------------
    ||   |      | On Captain (F/O) W & LD indicator, no illumi-  |
    OK  NOT OK----| nation of LAND 3 caption light, with FD 2 and |
    ||          | AT 1 (AT2 ) engaged.                           |
    ||          | Ref. Chart 120                                 |
    ||          --------------------------------------------------
    ||
*************************************************
* Engage AT2 (AT1) switch in IAS ACQ mode, then dis-*
* engage AT1 (AT2) switch.                          *
* On W & LD indicator No.1 [1] (No.2 [2]), check    *
* that LAND 3 caption light is illuminated. IF      *
*************************************************
    ||   |
    ||   |      --------------------------------------------------
    ||   |      | On Captain (F/O) W & LD indicator, no illumi-  |
    ||   |      | nation of LAND 3 caption light, with FD 2 and  |
    OK  NOT OK----| AT 2 (AT 1) engaged.                          |
    ||          | Ref. Chart 121.                                |
    ||          --------------------------------------------------
    ||
*************************************************
* On W & LD No.1 [1] (No.2 [2]) indicator, check    *
* that LAND 2 caption light is illuminated. IF      *
*************************************************
    ||   |
    ||   |      --------------------------------------------------
    ||   |      | On Captain (F/O) W & LD indicator no illumi-   |
    OK  NOT OK----| nation of LAND 2 caption light.               |
    ||          | Replace W & LD computer No.1 [7] (No.2 [8]).   |
    ||          --------------------------------------------------
    ||
    ||
```

```
    ||
    ||
*****************************************************
* On Captain (F/O) radio altimeter indicator, simu- *
* late altitude lower than 300 feet. On AFCS control*
* unit [13], select a runway heading on each VOR/LOC*
* counter with a difference of more than 4° between *
* the two. On flight control unit, place O & M ELE- *
* VONS selector in MECH position. On W & LD No.1 [1]*
* (No.2 [2]) indicator, check that LAND 3 caption   *
* light remains illuminated. IF                     *
*****************************************************
    ||     |
    ||     |    -------------------------------------------------------
    OK   NOT OK--| No self held capability for altitude lower than    |
    ||           | 300 feet on failure of runway heading display      |
    ||           | and/or mechanical operation of Outer and Middle    |
    ||           | Elevons.                                           |
    ||           | Replace W & LD computer No.1 [7] (No.2 [8]).       |
    ||          -------------------------------------------------------
    ||
*****************************************************
* Trip circuit breaker [49] ([50]). Check that LAND *
* 3 caption light on W & LD indicator No.1 [1] (No.2*
* [2]) extinguishes. IF                             *
*****************************************************
    ||     |
    ||     |    -------------------------------------------------------
    OK   NOT OK--| For radio altimeter fault, altitude less than      |
    ||           | 300 feet, LAND 3 caption light on Captain (F/O)    |
    ||           | W & LD indicator does not extinguish.              |
    ||           | Replace W & LD computer No.1 [7] (No.2 [8]).       |
    ||          -------------------------------------------------------
    ||
*****************************************************
* Reset circuit breaker [49] ([50]).                *
* Reset both VOR-LOC counters to the same heading   *
* value.                                            *
* Place O & M ELEVONS selector switch in BLUE       *
* position.                                         *
* On Captain (F/O) radio altimeter, display on      *
* altitude of 1600 feet.                            *
* On RELAY JACK unit, place GREEN ONLY -            *
* NORM-BLUE ONLY selector switch in BLUE ONLY       *
* position.                                         *
* On W & LD indicator No.1 [1] (No.2 [2]), LAND 3   *
* caption light extinguishes. IF                    *
*****************************************************
    ||   |
    ||   |
    ||   |          -----------------------------------------------------
```

```
||  |
OK  NOT OK----| On Captain (F/O) W & LD indicator, LAND 3   |
||            | caption light remains illuminated following |
||            | hydraulic pressure drop.                    |
||            | Ref. Chart 122.                             |
||            ----------------------------------------------
||
```


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```
    ||
******************************************************
* Place GREEN ONLY - NORM - BLUE ONLY switch          *
* in NORM position                                     *
* Check that each time O & M ELEVONS, IN. ELEVONS,     *
* and RUDDER switches are placed, in turn, in MECH     *
* position, LAND 2 and LAND 3 caption lights           *
* extinguish on W & LD indicator No.1 [1]              *
* (No.2 [2]). IF                                       *
******************************************************
    ||   |
    ||   |          ----------------------------------------------------
    ||   |         | On Captain (F/O) W & LD indicator LAND 2 and       |
    OK   NOT OK----| LAND 3 caption lights do not extinguish on         |
    ||             | setting of flight controls to mechanical mode.     |
    ||             | Ref. Chart 123                                     |
    ||              ----------------------------------------------------
    ||
******************************************************
* O & M ELEVONS, IN. ELEVONS, and RUDDER switches      *
* being placed in BLUE position:                       *
* On AFCS control unit [13], on each VOR - LOC         *
* counter, select a runway heading, with at least      *
* 4° discrepancy between these headings                *
* On W & LD No. 1 [1] (No.2 [2]) indicator, check      *
* that LAND 3 caption light extinguishes. IF           *
******************************************************
    ||   |
    ||   |          ----------------------------------------------------
    ||   |         | LAND 3 caption light does not extinguish           |
    OK   NOT OK----| on Captain (F/O) W & LD indicator, on error        |
    ||             | in display of runway heading.                      |
    ||             | Ref. Chart 124                                     |
    ||              ----------------------------------------------------
    ||
******************************************************
* Reset both VOR-LOC counters to identical value.      *
* Trip circuit breaker [28]                            *
* On W & LD indicator No.1 [1] (No.2 [2]), check       *
* that LAND 3 caption light extinguishes. IF           *
******************************************************
    ||   |
    ||   |          ----------------------------------------------------
    ||   |         | On Captain (F/O) W & LD indicator LAND 3           |
    OK   NOT OK----| caption light does not extinguish on failure       |
    ||             | of ISCU                                            |
    ||             | Ref. Chart 125.                                    |
    ||              ----------------------------------------------------
    ||
```

```
    ||
*****************************************************
* Reset circuit breaker [28]                        *
* Disengage FD2, only engaged channel.              *
* On W & LD indicator No.1 [1] (No.2 [2]),          *
* check that LAND 3 caption light extinguishes. IF  *
*****************************************************
    ||   |
    ||   |      -----------------------------------------------
    ||   |     | On Captain (F/O) W & LD indicator LAND 3      |
    OK  NOT OK-| caption light does not extinguish on loss of  |
    ||         | the engaged FD channel.                       |
    ||         | Ref. Chart 126.                               |
    ||          -----------------------------------------------
    ||
*****************************************************
* With AT2 (AT1) engaged, engage FD2 switch.        *
* On AUTOTHROTTLE section, engage IAS HOLD mode.    *
* On W & LD indicator No.1 [1] (No.2 [2])           *
* check that LAND 2 and LAND 3 caption lights       *
* extinguish. IF                                    *
*****************************************************
    ||   |
    ||   |      -----------------------------------------------
    ||   |     | On Captain (F/O) W & LD indicator, LAND 2 and |
    OK  NOT OK-| LAND 3 caption lights remain illuminated with |
    ||         | only AT 2 (AT 1) lane engaged when changing   |
    ||         | from IAS ACQ mode to IAS HOLD mode.           |
    ||         | Ref. Chart 127.                               |
    ||          -----------------------------------------------
    ||
*****************************************************
* Engage AT1 (AT2) switch. Select IAS ACQ mode.     *
* Disengage AT2 (AT1) switch, then, on AUTOTHROTTLE *
* section, select IAS HOLD mode.                    *
* On W & LD No.1 [1] (No.2 [2]) indicator check     *
* that LAND 2 and LAND 3 caption lights extinguish. *
* IF                                                *
*****************************************************
    ||   |
    ||   |      -----------------------------------------------
    ||   |     | On Captain (F/O) W & LD indicator, LAND 2 and |
    ||   |     | LAND 3 caption lights remain illuminated, with|
    OK  NOT OK-| only AT No.1 (AT No.2) channel engaged when   |
    ||         | changing from IAS ACQ to IAS HOLD mode.       |
    ||         | Ref. Chart 128                                |
    ||          -----------------------------------------------
```

```
    ||
*****************************************************
* Select IAS ACQ mode. Engage AT2 switch. Disengage *
* AT1 switch. Simulate flight config by tripping    *
* circuit breakers [35] [36]. Select GLIDE mode.    *
* Check that associated prime indicator light illu- *
* minates. Using VOR/ILS ground test unit, capture  *
* GLIDE beam. Wait for 14 seconds then check that   *
* LAND 2 and LAND 3 caption lights on W & LD No.1   *
* [1] (No.2 [2]) indicator remain illuminated. IF   *
*****************************************************
    ||    |
    ||    |     -----------------------------------------------------
    ||  NOT OK--| With one autothrottle engaged in IAS/ACQ, GLIDE  |
    ||    |     | beam captured, LAND 3 caption light on Captain   |
    ||    |     | (F/O) W & LD indicator extinguishes.             |
    ||    |     | Ref. Chart 129                                   |
    ||    |     -----------------------------------------------------
    ||    |
    ||    |     -----------------------------------------------------
    OK  NOT OK--| With one autothrottle engaged in IAS/ACQ, GLIDE  |
    ||          | beam captured, LAND 2 and LAND 3 caption lights  |
    ||          | on Captain (F/O) W & LD indicator extinguish.    |
    ||          | Replace W & LD computer No.1 [7] (No.2 [8]).     |
    ||          -----------------------------------------------------
    ||
*****************************************************
* On ADC control panel, place ADC No.1 switch in OFF*
* position. Check that LAND 3 caption light on W &  *
* LD No.1 [1] (No.2 [2]) indicator extinguishes. IF *
*****************************************************
    ||   |
    ||   |        ---------------------------------------------------
    OK  NOT OK----| On Captain (F/O) W & LD indicator, LAND 3     |
    ||            | caption light remains illuminated on failure  |
    ||            | of ADC No.1                                   |
    ||            | Replace W & LD computer No.1 [7] (No.2 [8]).  |
    ||            ---------------------------------------------------
    ||
*****************************************************
* Place ADC No.1 in ON position, then reset.        *
* Engage AT1 switch. Select IAS ACQ mode            *
* Disengage AT2 switch.                             *
* Place ADC2 switch in OFF position.                *
* On W & LD indicator No.1 [1] (No.2 [2]), LAND 3   *
* caption light extinguishes. IF                    *
*****************************************************
    ||   |
    ||   |        ---------------------------------------------------
    ||   |        | On Captain (F/O) W & LD indicator, LAND 3     |
    ||   |        | caption light remains illuminated on failure  |
    OK  NOT OK----| of ADC No.2                                   |
```

Replace W & LD computer No.1 [7] (No.2 [8]).

```
    ||
*****************************************************
* Place ADC 2 switch in ON position, then reset.    *
* On ZA socket of W & LD computer No.1 [7]          *
* (No.2 [8]) front face, remove wire connecting     *
* terminal 28 to terminal 1.                        *
* On W & LD No.1 [1] (No.2 [2]), LAND 3 caption     *
* light extinguishes. IF                            *
*****************************************************
    ||   |
    ||   |     -------------------------------------------------
    ||   |     | On Captain (F/O) W & LD indicator, LAND 3     |
    OK  NOT OK----| caption light remains illuminated on loss of |
    ||         | busbar isolation.                             |
    ||         | Replace W & LD computer No.1 [7] (No.2 [8]).  |
    ||         -------------------------------------------------
    ||
*****************************************************
* Connect terminal 28 to terminal 1 of W & LD       *
* computer No.1 [7] (No.2 [8]) ZA socket.           *
* Disengage AP No.1 switch.                         *
* On W & LD indicator No.1 [1] (No.2 [2]), check    *
* that LAND 3 caption light extinguishes. IF        *
*****************************************************
    ||   |
    ||   |     -------------------------------------------------
    ||   |     | On Captain (F/O) W & LD indicator, LAND 3     |
    OK  NOT OK----| caption light remains illuminated on loss of |
    ||         | AP No.1                                       |
    ||         | Replace W & LD computer No.1 [7] (No.2 [8]).  |
    ||         -------------------------------------------------
    ||
*****************************************************
* Engage AP1 switch, then select LAND mode.         *
* Disengage AP2 switch.                             *
* On W & LD indicator No.1 [1] (No.2 [2]), check    *
* that LAND 3 caption light extinguishes. IF        *
*****************************************************
    ||   |
    ||   |     -------------------------------------------------
    ||   |     | On Captain (F/O) W & LD indicator, LAND 3     |
    OK  NOT OK----| caption light remains illuminated on loss of |
    ||         | AP No.2                                       |
    ||         | Replace W & LD computer No.1 [7] (No.2 [8]).  |
    ||         -------------------------------------------------
    ||
```

```
    ||
*****************************************************
* Disengage AP1 switch.                             *
* On W & LD indicator No.1 [1] (No.2 [2]), check    *
* that LAND 2 caption light extinguishes. IF        *
*****************************************************
    ||   |
    ||   |         ---------------------------------------------------
    ||   |        | On Captain (F/O) W & LD indicator, LAND 2         |
    OK   NOT OK---| caption light remains illuminated on loss of      |
    ||            | AP No.1, with AP No.2 disengaged.                 |
    ||            | Replace W & LD computer No.1 [7] (No.2 [8]).      |
    ||             ---------------------------------------------------
    ||
*****************************************************
* Engage AP1 switch, select LAND mode.              *
* Engage AP2                                        *
* Place INS No.3 MSU selector switch in OFF position*
* On Captain instrument panel, INS No.3 warning     *
* light illuminates.                                *
* On W & LD indicator No.1 [1] (No.2 [2]) LAND 3    *
* caption light extinguishes. IF                    *
*****************************************************
    ||   |
    ||   |         ---------------------------------------------------
    ||   |        | On Captain (F/O) W & LD indicator, LAND 3         |
    ||   |        | caption light remains illuminated on loss of      |
    OK   NOT OK---| INS No.3                                          |
    ||            | Replace W & LD computer No.1 [7] (No.2 [8]).      |
    ||             ---------------------------------------------------
    ||
*****************************************************
* Landing capability indication function is         *
* connection on lane 2. IF                          *
*****************************************************
    ||   |
    ||   |         ---------------------------------------------------
    OK   NOT OK---| Repeat procedure for lane 2, referring to         |
    ||            | information mentioned in parentheses.             |
    ||             ---------------------------------------------------
*****************************************************
* Restore systems to initial condition.             *
*****************************************************
```

```
DH Decision Height Indication
*****************************************************
*                                                   *
* Energize radio altimeter No.1 [26] (No.2 [27])    *
* Do not connect simulator.                         *
* On Captain (F/O) radio altimeter, select an alti- *
* tude of 200 feet (preselected altitude marker)    *
* Check on W & LD indicator No.1 [1] (No.2 [2])     *
* that DH caption light illuminates. IF             *
*****************************************************
     ||  |
     ||  |     ---------------------------------------------------
     ||  |     | On Captain (F/O) W & LD indicator, no illumi-   |
     OK  NOT OK----| nation of DH caption light following height |
     ||        | discrepancy.                                    |
     ||        | Ref. Chart 130                                  |
     ||        ---------------------------------------------------
     ||
*****************************************************
* On Captain (F/O) radio altimeter indicator, select*
* an altitude of 50 feet, then carry out radio      *
* altimeter test.                                   *
* When altitude discrepancy becomes null, check     *
* on W & LD indicator No.1 [1] (No.2 [2]) that DH   *
* caption light extinguishes. IF                    *
*****************************************************
     ||  |
     ||  |     ---------------------------------------------------
     ||  |     | On Captain (F/O) W & LD indicator, DH caption   |
     OK  NOT OK----| light remains illuminated, although altitude |
     ||        | discrepancy is null.                            |
     ||        | Ref. Chart 131                                  |
     ||        ---------------------------------------------------
*****************************************************
* Decision Height function is correct on lane 2. IF *
*****************************************************
     ||  |
     ||  |     ---------------------------------------------------
     OK  NOT OK----| Repeat procedure for lane 2, referring to   |
     ||        | information given in parentheses.               |
     ||        ---------------------------------------------------
     ||
*****************************************************
* Restore systems to initial condition.             *
*****************************************************
```

Excessive Beam Deviation Warning

```
*****************************************************
* Trip circuit breaker [10] ([6]).                  *
* Place Captain and F/O RAD/INS switches in RAD     *
* position.                                         *
* Connect radio altimeter ground test unit to radio *
* altimeter transceiver No.1 [26] (No.2 [27])       *
* and simulate an altitude above 600 feet.          *
* Energize VOR/ILS ground test unit.                *
* Engage AP1 (AP2) switch, then select LAND mode.   *
* Simulate an aircraft deviation above GLIDE beam.  *
* On both W & LD indicators, check that the lower   *
* deviation bar and the aircraft symbol illuminate. *
* IF                                                *
*****************************************************
    ||   |
    ||   |         --------------------------------------------------
    ||   |        | On each W & LD indicator, no illumination of     |
    OK   NOT OK---| the lower excessive beam deviation bar and       |
    ||            | the aircraft symbol,                             |
    ||            | With aircraft above GLIDE beam.                  |
    ||            | Ref. Chart 133                                   |
    ||             --------------------------------------------------
*****************************************************
* Simulate an aircraft deviation below GLIDE beam.  *
* On W & LD indicators, check that the upper        *
* deviation bar and the aircraft symbol illuminate. *
* IF                                                *
*****************************************************
    ||   |
    ||   |         --------------------------------------------------
    ||   |        | On both W & LD indicators, the upper excessive   |
    OK   NOT OK---| beam deviation bars and the aircraft symbols     |
    ||            | do not illuminate, the aircraft being below      |
    ||            | GLIDE beam                                       |
    ||            | Replace W & LD computer No.1 [7] (No.2 [8]).     |
    ||             --------------------------------------------------
    ||
```

```
    ||
*****************************************************
* Simulate on altitude lower than 100 feet.         *
* On each W & LD indicator, check that the          *
* relevant Glide deviation bar and the aircraft     *
* symbol extinguish. IF                             *
*****************************************************
    ||   |
    ||   |    -----------------------------------------------------
    ||   |    | On each W & LD indicator, the lower excessive     |
    OK   NOT OK----| beam deviation bar and the aircraft symbol   |
    ||        | do not extinguish, at an altitude below           |
    ||        | 100 feet, with the aircraft below GLIDE beam.     |
    ||        | Replace W & LD computer No.1 [7] (No.2 [8]).      |
    ||        -----------------------------------------------------
    ||
*****************************************************
* Cancel Glide deviation then simulate an aircraft  *
* deviation to the right then to the left of LOC    *
* beam.                                             *
* In each case, check that the associated LOC beam  *
* deviation bar as well as the aircraft symbol      *
* illuminate. IF                                    *
*****************************************************
    ||   |
    ||   |    -----------------------------------------------------
    ||   |    | On each W & LD indicator, the associated          |
    OK   NOT OK----| lateral deviation bar and the aircraft       |
    ||        | symbol do not illuminate, with an  aircraft       |
    ||        | deviation to the right or to the left of LOC      |
    ||        | beam.                                             |
    ||        | Replace W & LD computer No.1 [7] (No. 2 [8]).     |
    ||        -----------------------------------------------------
    ||
*****************************************************
* Excessive beam deviation function is correct      *
* on lane 2. IF                                     *
*****************************************************
    ||   |
    ||   |    -----------------------------------------------------
    OK   NOT OK----| Repeat procedure with lane 2, referring to   |
    ||        | information given in parentheses.                 |
    ||        -----------------------------------------------------
*****************************************************
* Restore systems to initial condition.             *
*****************************************************
```

ILS Failure Warning

```
*****************************************************
* Trip circuit breaker [10] ([6]).                  *
* Engage AP1, FD1, AT1 (AP2, FD2, AT2) switches.    *
* Connect radio altimeter ground test unit with     *
* radio altimeter transceiver No.1 [26] (No.2 [27]) *
* then simulate a radio altitude over 600 feet.     *
* Select GLIDE mode, then proceed with LOC and GLIDE*
* beam capture.                                     *
* Place Captain (F/O) RAD/INS switch [39] ([40]) in *
* INS position.                                     *
* Check that when LOC pointers disappear from       *
* HSI and ADI, on each W & LD indicator, the        *
* LOC beam deviation bar and the aircraft symbol    *
* flash. IF                                         *
*****************************************************
     ||     |
     ||     |          ------------------------------------------------
     ||     |         | On LOC failure : on W & LD indicators,         |
     ||   NOT OK----| no flashing of either LOC deviation bar.       |
     ||     |         | Replace W & LD computer No.1 [7] (No.2 [8]).   |
     ||     |          ------------------------------------------------
     ||     |
     ||     |          ------------------------------------------------
     ||     |         | On LOC failure : on each W & LD indicator,     |
     OK   NOT OK----| no flashing of the aircraft symbol.            |
     ||     |         | Replace W & LD computer No.1 [7] (No.2 [8]).   |
     ||     |          ------------------------------------------------
     ||     |
     ||     |          ------------------------------------------------
     ||     |         | On lane 1 (lane 2) LOC failure, with GLIDE     |
     ||     |         | mode engaged : on each W & LD indicator, LOC   |
     ||   NOT OK----| deviation bar and aircraft symbol are not      |
     ||               | flashing.                                      |
     ||               | Ref. Chart 134.                                |
     ||                ------------------------------------------------
     ||
*****************************************************
* Select LAND mode. Check that on illumination of   *
* LAND mode selection push-button, the LOC beam     *
* excessive deviation bar is flashing on each       *
* W & LD indicator. IF                              *
*****************************************************
     ||     |
     ||     |          ------------------------------------------------
     ||     |         | On LOC failure with LAND mode engaged, on      |
     OK   NOT OK----| each W & LD indicator, the LOC beam excessive  |
     ||               | deviation bar is not flashing.                 |
     ||               | Ref. Chart 135.                                |
     ||                ------------------------------------------------
```

```
    ||
***************************************************
* Place Captain and F/O FD1/FD2 switches in FD1   *
* (FD2) position.                                 *
* Check on each ADI that the roll or yaw FD bars  *
* are out of view. IF                             *
***************************************************
    ||   |        --------------------------------------------------
    ||   |       | On LOC failure, in LAND mode, no cancellation  |
    ||   NOT OK----| of either roll or yaw FD bar on each ADI.     |
    ||   |       | Ref. Chart 136.                                 |
    OK   |        ==================================================
    ||   |        --------------------------------------------------
    ||   |       | On LOC failure in LAND mode, on each ADI,       |
    ||   NOT OK----| the two roll and yaw FD bars do not disappear. |
    ||           | Replace W & LD computer No.1 [7] (No.2 [8]).    |
    ||            --------------------------------------------------
***************************************************
* Place Captain (F/O) RAD/INS switch [39] ([40]) in *
* RAD position.                                   *
* The LOC beam excessive deviation bars stop      *
* flashing.                                       *
* Trip circuit breaker [37] ([38]).               *
* Check that, on each W & LD indicator, the       *
* LOC and GLIDE beam deviation bars as well as the *
* aircraft symbol are flashing. IF                *
***************************************************
    ||   |        --------------------------------------------------
    ||   |       | On lane 1 (lane 2) ILS reception failure,       |
    OK   NOT OK----| no flashing of GLIDE excessive beam deviation |
    ||   |       | bar on either W & LD indicator.                 |
    ||   |       | Replace W & LD computer No.1 [7] (No.2 [8]).    |
    ||   |        ==================================================
    ||   |        --------------------------------------------------
    ||   |       | On lane 1 (lane 2) ILS reception failure on     |
    ||   NOT OK----| each W & LD indicator, no flashing of         |
    ||   |       | LOC deviation bar. Replace ILS receiver No.1    |
    ||   |       | [43] (No.2 [44]).                               |
    ||   |        --------------------------------------------------
    ||   |        --------------------------------------------------
    ||   |       | On lane 1 (lane 2) ILS reception failure,       |
    ||   NOT OK----| no flashing of GLIDE deviation bar            |
    ||           | on each W & LD indicator.                       |
    ||           | Ref. Chart 137.                                 |
    ||            --------------------------------------------------
```

```
    ||
*****************************************************
* Check on each ADI that the three pitch, roll,     *
* and yaw FD bars are out of view.                  *
* IF                                                *
*****************************************************
    ||   |
    ||   |    ----------------------------------------------------
    ||   |    | On lane 1 (lane 2) ILS reception failure,          |
    ||  NOT OK----| either pitch FD bar remains visible.        |
    ||   |    | Ref. Chart 138.                                    |
    ||   |    ----------------------------------------------------
    OK   |    ----------------------------------------------------
    ||   |    | On lane 1 (lane 2) ILS reception failure,          |
    ||  NOT OK----| both pitch FD bars on both ADIs remain visible.|
    ||        | Replace W & LD computer No.1 [7] (No.2 [8]).       |
    ||        ----------------------------------------------------
    ||
*****************************************************
* Select radio altitude lower than 600 feet checked *
* against F/O ADI. Check that LOC and GLIDE beam    *
* deviation bars and aircraft symbol on the two W & *
* LD indicators do not flash. IF                    *
*****************************************************
    ||    |
    ||    |   ------------------------------------------------------
    OK   NOT OK--| LOC and GLIDE bars and aircraft symbol flash with|
    ||           | altitude lower than 600 feet. Replace W & LD     |
    ||           | computer No.1 [7] (No.2 [8]).                    |
    ||           ------------------------------------------------------
    ||
*****************************************************
* Set circuit breaker [37] [38]. Select altitude    *
* greater than 600 feet. Select PITCH HOLD mode then*
* GLIDE mode. GLIDE mode push-button illuminates    *
* given that conditions for capture exist. Place    *
* F/O [40] (Captain [39]) RAD/INS switch in INS     *
* position.                                         *
* Trip circuit breaker [11] ([12]). On W & LD indi- *
* cators, check that LOC bars and aircraft symbol   *
* flash. IF                                         *
*****************************************************
    ||    |
    ||    |   ------------------------------------------------------
    OK   NOT OK==| LOC bars and aircraft symbol do not flash with   |
    ||           | LOC faulty and W & LD computer lane 2 (lane 1) in|
    ||           | GLIDE mode. Ref. Chart 139.                      |
    ||           ------------------------------------------------------
```

```
    ||
***************************************************
* Place F/O [40] (Captain [39]) RAD/INS switch in   *
* RAD position. Set circuit breaker [11] ([12]).    *
* Trip circuit breakers [38], [50] ([37], [49]).    *
* Check that LOC and GLIDE bars and aircraft symbol *
* flash on the two W & LD indicators. IF            *
***************************************************
     ||    |
     ||    |    ---------------------------------------------------
     OK  NOT OK--| LOC and GLIDE bars and aircraft symbol on the two|
     ||          | W & LD indicators with ILS reception and radio  |
     ||          | altimeter lane 2 (lane 1) failure, do not flash. |
     ||          | Ref. Chart 140                                  |
     ||          ---------------------------------------------------
     ||
***************************************************
* Select LAND mode. Check that when LAND mode push  *
* button illuminates, beam deviation bars and air-  *
* craft symbol on the two W & LD indicators stop    *
* flashing. IF                                      *
***************************************************
     ||    |
     ||    |    ---------------------------------------------------
     OK  NOT OK--| LOC and GLIDE bars and aircraft symbol on the two|
     ||          | W & LD indicators do not extinguish when LAND   |
     ||          | mode is selected with ILS and Radio Altimeter   |
     ||          | lane 2 (lane 1) reception failure. Replace W & LD|
     ||          | computer No.1 [7] (No.2 [8]).                   |
     ||          ---------------------------------------------------
     ||
***************************************************
* Set circuit breakers [38], [50] ([37], [49]). Shut*
* down VOR/ILS Ground Test Unit. Check that LOC and *
* GLIDE bars flash and aircraft symbol remains      *
* extinguished on the two W & LD indicators. IF     *
***************************************************
     ||    |
     ||    |    ---------------------------------------------------
     OK  NOT OK--| LOC and GLIDE bars on the two W & LD indicators  |
     ||          | do not flash with ILS transmission failure.     |
     ||          | Replace W & LD computer No.1 [7] (No.2 [8]).    |
     ||          ---------------------------------------------------
     ||
     ||
```

```
    ||
******************************************
* Disengage AT1 (AT2) switch.            *
* Place at least two throttle control    *
* levers in max. thrust position.        *
* GO AROUND caption light illuminates.   *
* Check that LOC and GLIDE deviation bars *
* extinguish on each W & LD indicator.   *
* IF                                     *
******************************************
    ||   |
    ||   |        ---------------------------------------------------
    ||   |       | On GO AROUND initiation,                          |
    OK  NOT OK---| LOC and GLIDE excessive beam deviation bars       |
    ||           | do not extinguish on each W & LD indicator.       |
    ||           | Replace W & LD computer No.1 [7] (No.2 [8]).      |
    ||            ---------------------------------------------------
    ||
    ||
```

```
    ||
*****************************************************
* Select HDG HOLD mode.                             *
* Disengage FD1 (FD2) switch.                       *
* Check that the three FD bars are out of view      *
* on each ADI. IF                                   *
*****************************************************
    ||   |
    ||   |        ---------------------------------------------------
    OK   NOT OK----| No cancellation of the three FD control bars    |
    ||             | in HDG mode, following GO AROUND.               |
    ||             | initiation.                                     |
    ||             | Ref. Chart 141                                  |
    ||            ---------------------------------------------------
    ||
*****************************************************
* ILS failure warning function is correct on        *
* lane 2. IF                                        *
*****************************************************
    ||   |
    ||   |        ---------------------------------------------------
    ||   |         | Repeat procedure with lane 2 in place of        |
    OK   NOT OK----| lane 1, referring to information given in       |
    ||             | parentheses.                                    |
    ||            ---------------------------------------------------
    ||
*****************************************************
* Restore systems to initial condition.             *
*****************************************************
```

```
AUTOLAND Failure Warning
*****************************************************
* Trip circuit breaker [10] ([6]).                  *
* Both radio altimeters being energized, connect    *
* radio altimeter ground test unit to radio         *
* altimeter No.1 [26] (No.2 [27]) and simulate      *
* a radio altitude of 1600 feet on Captain (First   *
* Officer) indicator.                               *
* Engage AP1 and FD1 (AP2 and FD2) switches,        *
* then select LAND mode.                            *
* By means of VOR/ILS ground test unit, proceed to  *
* Glide beam capture and check that AT warning      *
* lights are flashing.                              *
* Decrease radio altitude below 600 feet to         *
* obtain 240 feet on First Officer (Captain) ADI.   *
* Check that both AUTOLAND warning lights are       *
* flashing. IF                                      *
*****************************************************
    ||   |
    ||   |       ----------------------------------------------------
    ||   |      | No flashing of AUTOLAND warning lights             |
    OK   NOT OK----| in LAND mode, GLIDE beam captured, with       |
    ||          | AT not engaged.                                    |
    ||          | Replace W & LD computer No.1 [7] (No.2 [8]).       |
    ||           ----------------------------------------------------
    ||
*****************************************************
* Engage AT1 (AT2) switch. Check that if both AT    *
* warning lights extinguish, both AUTOLAND warning  *
* lights keep flashing. IF                          *
*****************************************************
    ||   |       ----------------------------------------------------
    ||   |      | AUTOLAND warning not self-held in LAND mode,       |
    OK   NOT OK----| with Glide beam captured, after engagement of |
    ||          | one autothrottle lane.                             |
    ||          | Replace W & LD computer No.1 [7] (No.2 [8]).       |
    ||           ----------------------------------------------------
    ||
*****************************************************
* Disengage AP1 (AP2) switch.                       *
* Check that both AUTOLAND warning lights are       *
* not flashing any longer. IF                       *
*****************************************************
    ||   |       ----------------------------------------------------
    ||   |      | AUTOLAND warning lights do not extinguish          |
    OK   NOT OK----| on disengagement of AP1 (AP2) switch.         |
    ||          | Ref. Chart 142.                                    |
    ||           ----------------------------------------------------
```

```
    ||
*****************************************************
* Engage AP2 (AP1) switch.                          *
* Restore conditions for LAND mode with GLIDE beam  *
* capture.                                          *
* Place ADC1 (ADC2) TEST selector switch in COMP    *
* position.                                         *
* Check if both AUTOLAND warning lights are flashing*
* IF                                                *
*****************************************************
    ||  |           ----------------------------------------------
    OK  NOT OK----| No flashing of AUTOLAND warning light         |
    ||            | on failure of ADC comparison                  |
    ||            | Ref. Chart 143.                               |
    ||            ----------------------------------------------
    ||
*****************************************************
* Place TEST selector switch in NORM position, then *
* reset.                                            *
* AUTOLAND warning light being still active,        *
* disengage AT1 (AT2) switch.                       *
* Place at least two throttle control levers in     *
* max thrust position.                              *
* Check that when GO AROUND mode caption light      *
* illuminates, both AUTOLAND warning lights         *
* extinguish. IF                                    *
*****************************************************
    ||  |           ----------------------------------------------
    OK  NOT OK----| AUTOLAND warning lights do not extinguish     |
    ||            | on GO AROUND initiation.                      |
    ||            | Ref. Chart 144                                |
    ||            ----------------------------------------------
*****************************************************
* Select PITCH HOLD mode. Engage AT1 (AT2) switch.  *
* Select GLIDE mode then proceed to LOC and GLIDE   *
* beam captures.                                    *
* Decrease radio altitude to obtain a height        *
* within 200 to 100 feet.                           *
* Display data on F/O (Captain) ADI.                *
* Simulate LOC and GLIDE beam deviations            *
* Check that both AUTOLAND warning lights are       *
* extinguished. IF                                  *
*****************************************************
    ||  |
    ||  |           ----------------------------------------------
    OK  NOT OK----| Flashing of AUTOLAND warning lights           |
    ||            | in GLIDE mode at a radio altitude below 200ft,|
    ||            | with GLIDE and LOC beam deviations.           |
    ||            | Replace W & LD computer No.1 [7] (No.2 [8]).  |
    ||            ----------------------------------------------
```

```
    ||
*****************************************************
* Cancel LOC beam deviation.                        *
* GLIDE beam deviation remains at displayed radio   *
* altitude.                                         *
* Select LAND mode.                                 *
* Check if both AUTOLAND warning lights are flashing*
* IF                                                *
*****************************************************
    ||   |        ----------------------------------------------------
    ||   |       | No flashing of AUTOLAND warning lights self-      |
    OK   NOT OK----| held in LAND mode, at a radio altitude below      |
    ||           | 200 ft with GLIDE beam deviation.                 |
    ||           | Ref. Chart 145.                                   |
    ||            ----------------------------------------------------
*****************************************************
* Cancel GLIDE beam deviation,                      *
* Check that both AUTOLAND warning lights are       *
* still flashing. IF                                *
*****************************************************
    ||   |        ----------------------------------------------------
    ||   |       | AUTOLAND warning not self-held                    |
    OK   NOT OK----| in LAND mode, at a radio altitude below 200ft     |
    ||           | with no GLIDE or LOC beam deviation.              |
    ||           | Replace W & LD computer No.1 [7] (No.2 [8]).      |
    ||            ----------------------------------------------------
*****************************************************
* Simulate a GLIDE beam deviation.                  *
* Decrease radio altitude to obtain a height within *
* 100 to 0 ft. Press Captain AUTOLAND warning light.*
* Check that both AUTOLAND warning lights extinguish*
* IF                                                *
*****************************************************
    ||   |        ----------------------------------------------------
    ||   |       | AUTOLAND warning lights remain illuminated        |
    OK   NOT OK----| when Captain warning light is pressed.            |
    ||           | Ref. Chart 146.                                   |
    ||            ----------------------------------------------------
*****************************************************
* Cancel GLIDE deviation, simulate a LOC beam       *
* deviation at radio altitude displayed             *
* Check if AUTOLAND warning lights are flashing. IF *
*****************************************************
    ||   |        ----------------------------------------------------
    ||   |       | No flashing of AUTOLAND warning lights in LAND    |
    OK   NOT OK----| mode, at a radio altitude below 100 feet,         |
    ||           | with LOC beam deviation.                          |
    ||           | Ref. Chart 145                                    |
    ||            ----------------------------------------------------
    ||
```

```
    ||
**************************************************
* Cancel LOC beam deviation.                     *
* Check that both AUTOLAND warning lights are still *
* flashing. IF                                   *
**************************************************
    ||   |        ------------------------------------------------
    ||   |       | AUTOLAND warning not self-held                  |
    OK   NOT OK----| in LAND mode, at a radio altitude below 100 ft |
    ||           | with no LOC or GLIDE beam deviation.            |
    ||           | Replace W & LD computer No.1 [7] (No.2 [8]).    |
    ||            ------------------------------------------------
    ||
**************************************************
* Press F/O AUTOLAND warning light.              *
* Check that neither AUTOLAND warning is still   *
* flashing. IF                                   *
**************************************************
    ||   |        ------------------------------------------------
    ||   |       | AUTOLAND warning lights remain illuminated      |
    OK   NOT OK----| when F/O warning light is pressed.             |
    ||           | Ref. Chart 146.                                 |
    ||            ------------------------------------------------
**************************************************
* Disengage AP2 and FD1 (AP1 and FD2) switches.  *
* Engage AP1 (AP2) switch.                       *
* Select GLIDE mode, then proceed to LOC and GLIDE *
* beam captures.                                 *
* Switch off GLIDE beam transmission.            *
* Check if both AUTOLAND warning lights are flashing*
* IF                                             *
**************************************************
    ||   |        ------------------------------------------------
    ||   |       | No flashing of AUTOLAND warning lights          |
    OK   NOT OK----| on loss of GLIDE beam transmission.            |
    ||           | Ref. Chart 147.                                 |
    ||            ------------------------------------------------
**************************************************
* Switch on GLIDE beam transmission.             *
* Check if both AUTOLAND warning lights are still *
* flashing. IF                                   *
**************************************************
    ||   |        ------------------------------------------------
    ||   |       | AUTOLAND warning not self-held                  |
    OK   NOT OK----| following second capture of GLIDE beam.        |
    ||           | Replace W & LD computer No.1 [7] (No.2 [8]).    |
    ||            ------------------------------------------------
    ||
```

```
    ||
*****************************************************
* Press either AUTOLAND warning light.              *
* Switch off LOC beam transmission.                 *
* Check if both AUTOLAND warning lights are         *
* flashing. IF                                      *
*****************************************************
    ||   |      -------------------------------------------
    ||   |     | No flashing of AUTOLAND warning lights   |
    OK   NOT OK----| on loss of LOC beam transmission.    |
    ||         | Ref. Chart 147.                          |
    ||          -------------------------------------------
*****************************************************
* Switch LOC beam transmission.                     *
* Check if both AUTOLAND warning lights are still   *
* flashing. IF                                      *
*****************************************************
    ||   |      -------------------------------------------
    ||   |     | AUTOLAND warning not self-held           |
    OK   NOT OK----| following second capture of LOC beam.  |
    ||         | Replace W & LD computer No.1 [7] (No.2 [8]). |
    ||          -------------------------------------------
*****************************************************
* Cancel AUTOLAND warning.                          *
* AUTOLAND failure warning function is correct      *
* in lane 2. IF                                     *
*****************************************************
    ||   |      -------------------------------------------
    ||   |     | Repeat procedure for lane 2, referring to |
    OK   NOT OK----| information given in parentheses.     |
    ||          -------------------------------------------
*****************************************************
* Restore systems to initial condition.             *
*****************************************************
```

```
AP/AT Interlock
*****************************************************
*                                                   *
* Engage AP1, AT1 and FD1 (AP2, AT2 and FD2) switch-*
* es. Connect radio altimeter ground test unit to   *
* radio altimeter transceiver No.1 [26] (No.2 [27]),*
* Simulate a radio altitude within 100 to 600 feet. *
* Select LAND mode, then engage AP2 (AP1) switch.   *
* By means of VOR/ILS ground test unit, proceed     *
* to GLIDE and LOC beam capture.                    *
* Trip circuit breaker [37] ([38]).                 *
* Check that when G/S and LOC flags have appeared   *
* on ADI, AP1 (AP2) switch disengages. IF           *
*****************************************************
    ||   |            ----------------------------------------------------
    ||   |           | No disengagement of AP1 (AP2) switch               |
    ||   |           | at a radio altitude below 600 feet                 |
    OK   NOT OK----| when G/S and LOC flags appear on ADI               |
    ||               | Ref. Chart 148.                                    |
    ||                ----------------------------------------------------
    ||
*****************************************************
* Increase radio altitude above 600 feet.           *
* Check that if re-engaged, AP1 (AP2) switch        *
* remains in engaged position. IF                   *
*****************************************************
    ||   |            ----------------------------------------------------
    ||   |           | Not possible to engage AP1 (AP2) switch            |
    ||   NOT OK----| at a radio altitude above 600 feet,                |
    OK               | in LAND mode, with ILS failure                     |
    ||               | Ref. Chart No.149                                  |
    ||                ----------------------------------------------------
    ||
*****************************************************
* Switch off GLIDE beam transmission.               *
* Glide beam deviation bars only are flashing       *
* Decrease radio altitude below 600 feet.           *
* Check that AP1 (AP2) switch remains engaged. IF   *
*****************************************************
    ||   |            ----------------------------------------------------
    ||   |           | AP1 (AP2) switch does not remain in engaged        |
    ||   |           | position at a height below 600 feet,               |
    OK   NOT OK----| in LAND mode, with ILS GLIDE transmission          |
    ||               | failure.                                           |
    ||               | Ref. Chart 150                                     |
    ||                ----------------------------------------------------
    ||
```

```
    ||
*****************************************************
* Switch off LOC beam transmission.                 *
* Switch on GLIDE beam transmission.                *
* The LOC excessive beam deviation bars only are    *
* flashing.                                         *
* Check that AP1 (AP2) switch remains engaged. IF   *
*****************************************************
    ||   |    ----------------------------------------------
    ||   |   | AP1 (AP2) switch does not remain engaged,    |
    OK  NOT OK----| in LAND mode, at a radio altitude below 600 ft |
    ||       | with ILS LOC failure.                        |
    ||       | Ref. Chart 151.                              |
    ||        ----------------------------------------------
*****************************************************
* Disengage AT1 (AT2) switch.                       *
* Place at least two throttle control levers        *
* in max. thrust position.                          *
* GO AROUND mode caption light illuminates.         *
* Switch on LOC beam transmission.                  *
* Check that AP1 (AP2) switch remains engaged. IF   *
*****************************************************
    ||   |    ----------------------------------------------
    ||   |   | AP1 switch disengages on initiation of GO    |
    OK  NOT OK----| AROUND, with LOC and GLIDE beams captured    |
    ||       | Replace W & LD computer No.1 [7] (No.2 [8]). |
    ||        ----------------------------------------------
    ||
*****************************************************
* Place throttle control levers in mid-way position *
* Reset circuit breaker [37] ([38]).                *
* Engage AT1 (AT2) switch.                          *
* Select HDG HOLD mode, then LAND mode.             *
* Proceed to GLIDE beam capture only.               *
* Increase radio altitude above 600 feet.           *
* Trip cricuit breaker [49] ([50]).                 *
* Check that AP1 (AP2) switch disengages. IF        *
*****************************************************
    ||   |    ----------------------------------------------
    ||   |   | No disengagement of AP1 (AP2) switch         |
    OK  NOT OK----| when ALT flag appears,                       |
    ||       | in LAND mode, at a radio altitude above 600 ft.|
    ||       | Ref. Chart 152.                              |
    ||        ----------------------------------------------
    ||
    ||
```

```
    ||
*****************************************************
* Reset circuit breaker [49] ([50]).                *
* Engage AP1 (AP2) switch.                          *
* Place Captain (F/O) RAD/INS switch in INS position*
* Decrease radio altitude below 600 feet.           *
* Check that AP1 (AP2) switch disengages. IF        *
*****************************************************
    ||   |         ----------------------------------------------
    ||   |        | No disengagement of AP1 (AP2) switch at a    |
    OK   NOT OK---| radio altitude below 600 feet                |
    ||            | in LAND mode with LOC failure.               |
    ||            | Replace W & LD computer No.1 [7] (No.2 [8]). |
    ||             ----------------------------------------------
    ||
*****************************************************
* Place Captain (F/O) RAD/INS switch in RAD position*
* Engage AP1 (AP2) switch.                          *
* Place INS No.1 MSU selector switch in OFF         *
* position.                                         *
* Check AP1 and AT1 switches disengage. IF          *
*****************************************************
    ||   |         ----------------------------------------------
    ||   |        | No disengagement of AP1 and/or AT1 switch    |
    OK   NOT OK---| when INS No.1 is de-energized.               |
    ||            | Replace W & LD computer No.1 [7] (No.2 [8]). |
    ||             ----------------------------------------------
    ||
*****************************************************
* AP/AT interlock function is correct on lane 2. IF *
*****************************************************
    ||   |
    ||   |         ----------------------------------------------
    ||   |        | Repeat procedure with lane 2, referring to   |
    OK   NOT OK===| information given in parentheses.            |
    ||             ----------------------------------------------
    ||
*****************************************************
* Restore systems to initial condition              *
*****************************************************
```

```
***************************************
* FAULTY LIGHTS ON CAPTAIN (F/O)      *
* W & LD INDICATOR ON TEST OF LIGHTS.*
***************************************


*****************************************************
* For test purposes, replace Warning and Landing    *
* Display computer No.1 [7] (No.2 [8]). Repeat check*
* of lights by means of Captain and F/O DB LIGHTS   *
* TEST hold-to-test switches, as indicated in       *
* procedure. Lights illumination is correct.        *
*****************************************************
     |   |
     |   |
     |   |        ---------------------------------------------------
    NO  YES--------| Replace removed computer by the new one.          |
     |            ---------------------------------------------------
     |
     |            ---------------------------------------------------
     |            | As necessary, replace AT, or AP, or AUTOLAND      |
     |------------| light faulty bulb ; for the other lights,         |
                  | replace relevant Warning and Landing Display      |
                  | indicator.                                        |
                  ---------------------------------------------------
```

Chart 101

```
****************************************************
* ON BOTH WARNING AND LANDING DISPLAY INDICATORS   *
* NO ILLUMINATION OF LIGHTS ON TEST OF CAPTAIN     *
* (F/O) INDICATOR.                                 *
****************************************************


****************************************************
* Check on elapsed time indicator of W & LD        *
* computer No.1 [7] (No.2 [8]) if pointer          *
* is pulsating, indicating 115 VAC supply is       *
* provided from circuit breaker [12] ([11]).       *
****************************************************
     |   |
     |   |         ---------------------------------------------------
    YES  NO--------| Replace circuit breaker [12] ([11]).            |
     |             ---------------------------------------------------
     |
     |             ---------------------------------------------------
     |-------------| Replace W & LD computer No.1 [7] (No.2 [8]).    |
                   ---------------------------------------------------
```

Chart 102

```
**************************************
* NO FLASHING OF AT WARNING LIGHTS,  *
* WITH AUTOTHROTTLE SYSTEM NOT       *
* ENGAGED.                           *
**************************************


*****************************************************
* On ITEM control and indicator panel, respectively *
* place side 1 (side 2) IFM-OFF-TEST and FLIGHT-    *
* TEST ALL-TEST UNIT selector switches in IFM and   *
* FLIGHT positions. Wait one minute approximately   *
* until autotest is concluded and ITEM indication   *
* no longer appears on side 1 (side 2) quadrant     *
* lower indicator.                                  *
* Engage AT1. On circuit breaker panel 13-215,      *
* trip circuit breaker 1C179, map ref. C6.          *
* On ITEM control and indicator panel, place side 1 *
* (side 2) READ-CANCEL selector switch in READ      *
* position.                                         *
* Check if AT is displayed on side 1 (side 2)       *
* IFM quadrant upper window.                        *
*****************************************************
       |   |
       |   |        ---------------------------------------------------
      YES  NO-------| Replace AFCS control unit [13].                  |
       |            ---------------------------------------------------
*****************************************************
* For test purposes, replace Warning and Landing    *
* Display computer No.1 [1] (No.2 [2]). On circuit  *
* breaker panel 13-215, reset circuit breaker 1C179,*
* map ref. C6. Check if both AT warning lights are  *
* flashing on both Warning and Landing Display      *
* indicators [1] [2].                               *
*****************************************************
       |   |
       |   |        ---------------------------------------------------
      NO  YES-------| Replace removed computer by the new one.         |
       |            ---------------------------------------------------
       |
       |            ---------------------------------------------------
       |------------| Replace autothrottle computer No.2 [14].         |
                    ---------------------------------------------------
```

Chart 103

```
*************************************
* NO CANCELLATION OF AT WARNING     *
* ON ENGAGEMENT OF AT2 SWITCH, WITH *
* AT1 SWITCH NOT ENGAGED.           *
*************************************


****************************************************
* For test purposes, replace Warning and Landing   *
* Display computer No.1 [7] (No.2 [8]).            *
* Engage AT2 switch.                               *
* Check if on both Warning and Landing Display     *
* indicators, both AT warning lights extinguish.   *
****************************************************
    |   |
    |   |          -----------------------------------------------
   NO  YES---------| Replace removed computer by the new one.    |
    |              -----------------------------------------------
    |
    |
    |              -----------------------------------------------
    |--------------| Replace Autothrottle computer No.2 [14].     |
                   -----------------------------------------------
```

Chart 104

```
**************************************
* NO CANCELLATION OF AT WARNING      *
* ON OPERATION OF THROTTLE CONTROL   *
* LEVER No.1 AT DISCONNECT PUSH-     *
* BUTTON.                            *
**************************************


*****************************************************
* On throttle control lever No.4, press then release*
* AT instinctive disconnect push-button [16].       *
* Check if on both Warning and Landing Display      *
* indicators, both AT warning lights extinguish.    *
*****************************************************
      |   |
      |   |           --------------------------------------------------
     NO  YES--------| Replace instinctive disconnect switch [15].      |
      |               --------------------------------------------------
      |
      |               --------------------------------------------------
      |-------------| Replace W & LD indicator No.1 [7] (No.2 [8]).    |
                      --------------------------------------------------
```

Chart 105

```
**************************************
* NO CANCELLATION OF AT WARNING      *
* FOLLOWING ACTION ON CAPTAIN W & LD *
* INDICATOR AT WARNING LIGHT.        *
**************************************


*****************************************************
* Reset circuit breaker [9] ([5]). Trip circuit     *
* breaker [5] ([9]). On W & LD indicator No.1 [1],  *
* press then release AT warning light.              *
* Check if both AT warning lights extinguish.       *
*****************************************************
    |   |
    |   |
    |   |       --------------------------------------------------
   NO  YES--------| Replace W & LD computer No.1 [7] (No.2 [8]).  |
    |               --------------------------------------------------
    |
    |
    |               --------------------------------------------------
    |-------------| Replace W & LD indicator No.1 [1].             |
                    --------------------------------------------------
```

Chart 106

```
*************************************
* NO CANCELLATION OF AT WARNING     *
* FOLLOWING ACTION ON F/O W & LD    *
* INDICATOR AT WARNING LIGHT        *
*************************************


****************************************************
* Reset circuit breaker [9] ([5]). Trip circuit    *
* breaker [5] ([9]). Press then release AT warning *
* light on W & LD indicator No.2 [2].              *
* Check if both AT warning lights extinguish.      *
****************************************************
    |   |
    |   |       -----------------------------------------------
   NO  YES-------| Replace W & LD computer No.1 [7] (No.2 [8]). |
    |           -----------------------------------------------
    |
    |           -----------------------------------------------
    |------------| Replace W & LD indicator No.2 [2].           |
                -----------------------------------------------
```

Chart 107

```
*************************************-------------------------------
* NO AT WARNING LIGHT ON GLIDE BEAM  *| GROUND EQUIPMENT REQUIRED   |
* CAPTURE, WITH AP No.1 ENGAGED      *|-----------------------------|
* AND AT SYSTEM NOT ENGAGED.         *| DESCRIPTION        PART NO. |
*************************************|-----------------------------|
                                     | VOR/ILS GROUND              |
                                     | TEST UNIT                   |
                                     -------------------------------

**************************************************
* For test purposes, replace W & LD computer No.1*
* [7] (No.2 [8]).                                *
* Proceed to GLIDE beam capture, with AP No.1    *
* engaged.                                       *
* GLIDE mode selection push-button being         *
* illuminated, check if both AT warning lights   *
* are flashing.                                  *
**************************************************
    |   |
    |   |                ----------------------------------------
   NO  YES---------------| Replace W & LD indicator No.1        |
    |                    | (No.2 [8]).                          |
    |                    ----------------------------------------
    |
    |                    ----------------------------------------
    |--------------------| Replace AP/FD pitch computer No.1[17]|
                         ----------------------------------------
```

Chart 108

```
**************************************-------------------------------
* NO CANCELLATION OF AT WARNING IN   *| GROUND EQUIPMENT REQUIRED  |
* GO AROUND MODE AFTER GLIDE CAPTURE *|----------------------------|
* WITH AP No.1 ENGAGED AND AT SYSTEM *| DESCRIPTION       PART NO. |
* NOT ENGAGED.                       *|----------------------------|
**************************************| VOR/ILS GROUND             |
                                      | TEST UNIT                  |
                                       -----------------------------

***********************************************
* For test purposes, replace Warning and      *
* Landing Display computer No.1 [7] (No.2 [8]).*
* After a GLIDE beam capture, place at least  *
* two throttle control levers in maximum thrust*
* position.                                   *
* Check if when GO AROUND mode selection      *
* push-button illuminates, both AT warning    *
* lights extinguish.                          *
***********************************************
    |   |
    |   |   ------------------------------------------------------
   NO  YES---| Replace removed computer by the new one.             |
    |       ======================================================
    |
    |       ------------------------------------------------------
    |--------| Replace AP/FD azimuth computer No.1 [18].            |
            ------------------------------------------------------
```

Chart 109

```
**************************************-------------------------------
* NO AT WARNING ON GLIDE BEAM CAPTURE*| GROUND EQUIPMENT REQUIRED   |
* WITH AP No.2 ENGAGED AND AT SYSTEM *|-----------------------------|
* NOT ENGAGED.                       *| DESCRIPTION        PART NO. |
**************************************|=============================|
                                      | VOR/ILS GROUND              |
                                      | TEST UNIT                   |
                                      -------------------------------

*****************************************************
* Reset circuit breaker [11] ([12]). Trip circuit   *
* breaker [12] ([11]). Proceed to GLIDE beam capture*
* with AP No.2 engaged. GLIDE mode selection push-  *
* button being illuminated, check if both AT        *
* warning lights are flashing.                      *
*****************************************************
    |   |
    |   |      -----------------------------------------------
   NO  YES-----| Replace W & LD computer No.1 [7] (No.2 [8]). |
    |          -----------------------------------------------
    |
    |          -----------------------------------------------
    |----------| Replace AP/FD pitch computer No.2 [19].      |
               -----------------------------------------------
```

Chart 110

```
*************************************-------------------------------
* NO CANCELLATION OF AT WARNING      *| GROUND EQUIPMENT REQUIRED  |
* IN GO AROUND MODE, AFTER GLIDE     *|----------------------------|
* CAPTURE, WITH AP No.2 ENGAGED      *| DESCRIPTION       PART NO. |
* AND AUTOTHROTTLE SYSTEM NOT ENGAGED*|----------------------------|
**************************************| VOR/ILS GROUND             |
                                      | TEST UNIT                  |
                                      ------------------------------


*****************************************************
* For test purposes, replace Warning and Landing    *
* Display indicator No.1 [7] (No.2 [8]). Proceed to *
* a GLIDE beam capture and place at least two       *
* throttle control levers in maximum thrust position*
* Check if when GO AROUND mode selection push-      *
* button illuminates, both AT warning lights        *
* extinguish.                                       *
*****************************************************
     |    |
     |    |             ----------------------------------------------
    NO   YES-----------| Replace removed computer by the new one.    |
     |                  ----------------------------------------------
     |
     |
     |                  ----------------------------------------------
     |-----------------| Replace AP/FD azimuth computer No.2 [20].   |
                        ----------------------------------------------
```

Chart 111

```
*************************************-----------------------------
* NO AT WARNING IN ALT ACQ PHASE,    *| GROUND EQUIPMENT REQUIRED  |
* WITH FD1 ENGAGED AND AT SYSTEM     *|----------------------------|
* NOT ENGAGED.                       *| DESCRIPTION       PART NO. |
*************************************|----------------------------|
                                     | SIMULATOR-        87209455 |
                                     | PRESSURE SENSORS             |
                                      -----------------------------

*****************************************************
* Reset circuit breaker [9] ([5]). Trip             *
* circuit breaker [5] ([9]). Connect simulator to   *
* ADC1 front face test connector then proceed to    *
* altitude acquisition with FD1 engaged and ALT ACQ *
* selected as indicated in procedure which resulted *
* in fault detection.                               *
* The flashing of both AT warning lights must be    *
* noticed.                                          *
*****************************************************
    |   |
    |   |     --------------------------------------------------
   NO  YES--------| Replace W & LD computer No.1 [7] (No.2 [8]). |
    |             --------------------------------------------------
    |
    |             --------------------------------------------------
    |-------------| Replace AP/FD pitch computer No.1 [17].        |
                  --------------------------------------------------
```

Chart 112

```
***********************************-------------------------------
* NO AT WARNING IN ALT ACQ PHASE,   *| GROUND EQUIPMENT REQUIRED    |
* WITH FD2 ENGAGED AND AT SYSTEM    *|------------------------------|
* NOT ENGAGED.                      *| DESCRIPTION        PART NO.  |
*************************************|------------------------------|
                                     | SIMULATOR-         87209455  |
                                     | PRESSURE SENSORS             |
                                     --------------------------------


*****************************************************
* Reset circuit breaker [9] ([5]). Trip circuit     *
* breaker [5] ([9]). Connect simulator to ADC2      *
* front face test connector, then, proceed to       *
* altitude acquisition with FD2 engaged and ALT ACQ *
* selected as indicated in procedure which resulted *
* in fault detection.                               *
* The flashing of both AT warning lights must be    *
* noticed.                                          *
*****************************************************
     |   |
     |   |          ------------------------------------------------
     NO  YES-------| Replace W & LD computer No.1 [7] (No.2 [8]).   |
     |              ------------------------------------------------
     |
     |              ------------------------------------------------
     |-------------| Replace AP/FD pitch computer No.2 [19].        |
                    ------------------------------------------------
```

Chart 113

```
*************************************
* NO ILLUMINATION OF AP WARNING     *
* LIGHTS WITH AP/FD SYSTEM NOT      *
* ENGAGED.                          *
*************************************


*****************************************************
* For test purposes, replace Warning and Landing    *
* Display computer No.1 [7] (No.2 [8]). Both        *
* switches AP1 and AP2 being in disengaged position,*
* check if both AP warning lights are illuminated.  *
*****************************************************
     |   |
     |   |          --------------------------------------------------
    NO  YES--------| Replace removed computer by the new one.         |
     |              --------------------------------------------------
     |
     |              --------------------------------------------------
     |-------------| Replace AFCS control unit [13].                  |
                    --------------------------------------------------
```

Chart 114

```
***************************************---------------------------------
* NO AURAL WARNING                    *| GROUND EQUIPMENT REQUIRED     |
* ON AP DISENGAGEMENT.                *|-------------------------------|
***************************************| DESCRIPTION        PART NO.   |
                                       |----------------------------   |
                                       | MULTIMETER                    |
                                       ---------------------------------


*****************************************************
* On ZA test connector of W and LD computer No.1    *
* (No.2) front face, connect multimeter between     *
* terminals 53 and 59 (ground). Engage AP2 switch   *
* then press A/P DISC switch. When aural warning    *
* is triggered, voltage reading is :                *
*****************************************************
      |    |
      |    |       --------------------------------------------------
     OV   +5V------| Replace W & LD computer No.1 [7] (No.2 [8]).   |
      |            --------------------------------------------------
      |
*****************************************************
* Disconnect multimeter. Reset circuit breaker [9]  *
* ([5]). Re-engage AP2 switch then press A/P DISC   *
* switch. Check if when AP2 returns to OFF, aural   *
* warning is triggered.                             *
*****************************************************
      |    |
      |    |       --------------------------------------------------
     NO   YES------| Replace audio warning unit [21].               |
      |            --------------------------------------------------
      |
      |            --------------------------------------------------
      |            | Refer to master warning system trouble         |
      |------------| shooting (33-15-00).                           |
                   --------------------------------------------------
```

Chart 115

```
*************************************
* NO CANCELLATION OF AP WARNING     *
* FOLLOWING ACTION ON CAPTAIN AP    *
* INSTINCTIVE DISCONNECT SWITCH.    *
*************************************


*****************************************************
* On F/O control column handwheel, press A/P DISC   *
* switch. On both Warning and Landing Display       *
* indicators, check if both AP warning lights       *
* extinguish.                                       *
*****************************************************
    |    |
    |    |            -------------------------------------------------
   NO   YES----------| Replace instinctive disconnect switch [22]     |
    |                | ([23]).                                        |
    |                 -------------------------------------------------
    |
    |                 -------------------------------------------------
    |----------------| Replace W & LD computer No.1 [7] (No.2 [8]).  |
                      -------------------------------------------------
```

Chart 116

```
*************************************
* NO CANCELLATION OF AP WARNING     *
* FOLLOWING ACTION ON CAPTAIN W & LD *
* INDICATOR AP WARNING LIGHT.       *
*************************************


****************************************************
* Reset circuit breaker [9] ([5]).                 *
* Trip circuit breaker [5] ([9]).                  *
* AP warning being energized, press then release   *
* AP warning light on Captain Warning and Landing  *
* Display indicator.                               *
* Check if both AP warning lights extinguish.      *
****************************************************
     |   |
     |   |        ---------------------------------------------------
    NO  YES--------| Replace W & LD computer No.1 [7] (No.2 [8]).   |
     |            ---------------------------------------------------
     |
     |            ---------------------------------------------------
     |-------------| Replace W & LD indicator No.1 [1].             |
                  ---------------------------------------------------
```

Chart 117

```
*************************************
* NO CANCELLATION OF AP WARNING     *
* FOLLOWING ACTION ON F/O W & LD    *
* INDICATOR AP WARNING LIGHT.       *
*************************************


****************************************************
* Reset circuit breaker [9] ([5]).                 *
* Trip circuit breaker [5] ([9]).                  *
* AP warning being energized, press then release   *
* AP warning light on F/O Warning and Landing      *
* Display indicator.                               *
* Check if both AP warning lights extinguish       *
****************************************************
    |   |
    |   |       ------------------------------------------------
   NO  YES--------| Replace W & LD computer No.1 [7] (No.2 [8]).  |
    |               ------------------------------------------------
    |
    |               ------------------------------------------------
    |-------------| Replace W & LD indicator No.2 [2]             |
                    ------------------------------------------------
```

Chart 118

```
***************************************-------------------------------
* ON CAPTAIN (F/O) W & LD INDICATOR,  *| GROUND EQUIPMENT REQUIRED   |
* NO ILLUMINATION OF LAND 3 CAPTION   *-------------------------------
* LIGHT                               *| DESCRIPTION        PART NO. |
* WITH FD 1 AND AT 1 ENGAGED          *-------------------------------
***************************************| RADIO ALTIMETER             |
                                       | GROUND TEST UNIT            |
                                       -------------------------------

*****************************************************
* For test purposes, replace W & LD computer        *
* No.1 [7] (No.2 [8]).                              *
* On Captain (F/O) W & LD indicator, LAND 3 caption *
* light illuminates.                                *
*****************************************************
    |   |
    |   |      ----------------------------------------
    NO  YES----| Replace removed computer by the new one. |
    |          ----------------------------------------
    |
*****************************************************
* On Captain (F/O) W & LD indicator, LAND 2 caption *
* light is illuminated. If                          *
*****************************************************
    |   |
    |   |      ****************************************
    |   |      * Reset circuit breaker [11] ([12])      *
    YES NO-----* On F/O (Captain) indicator, LAND 2 caption *
    |          * light is illuminated.                  *
    |          ****************************************
    |                    |                 |
    |                    NO                YES
    |                    |                 |
    |          --------------------------- ---------------------------
    |          | Ref. 27-10-00, Trouble  | |                         |
    |          | Shooting relating to    | | Replace Autothrottle    |
    |          | Flight Controls.        | | computer No.1 [29]      |
    |          | Test No.2, step 02.     | | (No.2 [14])             |
    |          --------------------------- ---------------------------
    |
```

Chart 119 Sheet 1 of 3

```
****************************************************
* Reset circuit breaker [9] ([5])                  *
* On F/O (Captain) W & LD indicator, LAND 3 caption *
* light is illuminated.                            *
****************************************************
    |   |
    |   |        ********************************************
    |   |        * Trip circuit breaker [9] ([5]).          *
    |   |        * For test purposes, replace AP/FD pitch computer*
   YES NO--------* No.1 [17].                               *
    |            * On Captain (F/O) W & LD indicator check that *
    |            * LAND 3 caption light is illuminated.     *
    |            ********************************************
    |                     |                  |
    |                     |                  |
    |                    NO                 YES
    |                     |                  |
    |          ---------------------------------------------
    |          | Replace relay jack   || Replace removed computer |
    |          | hydraulic supply     || by the new one.          |
    |          | selector unit [30]   |---------------------------
    |          ------------------------
    |
****************************************************
* Trip circuit breaker [9] ([5])                   *
* For test purposes, replace AP/FD azimuth computer *
* No.1 [18].                                       *
* On Captain (F/O) W & LD indicator, check if      *
* LAND 3 caption light is illuminated.             *
****************************************************
    |   |        --------------------------------------------
   NO  YES-------| Replace removed computer by the new one. |
    |            --------------------------------------------
    |
    |
    |
    |
    |
```

Chart 119 Sheet 2 of 3

```
    |
**************************************************
* For test purposes, replace the Inertial Signals   *
* Comparator Unit [31].                              *
* On Captain (F/O) W & LD INDICATOR, LAND 3 caption *
* light is illuminated.                              *
**************************************************
    |    |
    |    |          ------------------------------------------------
    |    |          | Replace removed Inertial Signals comparator  |
    NO   YES-------| unit by the new one.                          |
    |               ------------------------------------------------
    |
    |               ------------------------------------------------
    |--------------| Replace compass coupler switching unit [32].  |
                    ------------------------------------------------
```

Chart 119 Sheet 3 of 3

```
*************************************-------------------------------
* ON CAPTAIN (F/O) W & LD INDICATOR, *| GROUND EQUIPMENT REQUIRED   |
* NO ILLUMINATION OF LAND 3 CAPTION  *------------------------------
* LIGHT WITH FD 2 AND AT 1 (AT 2)    *| DESCRIPTION        PART NO. |
* WITH FD No.2 AND AT No.1 (AT No.2) *------------------------------
* ENGAGED.                           *| RADIO ALTIMETER             |
**************************************| GROUND TEST UNIT            |
                                       ------------------------------

****************************************************
* For test purposes, replace W & LD computer No.1   *
* [7] (No.2 [8]).                                   *
* Check on Captain (F/O) W & LD indicator that      *
* LAND 3 caption light illuminates.                 *
****************************************************
    |   |
    |   |
    |   |            -------------------------------------------------
   NO  YES-------| Replace removed computer by the new one.        |
    |                -------------------------------------------------
    |
    |                =================================================
    |------------| Replace AP/FD azimuth computer No.2 [20].       |
                     -------------------------------------------------
```

Chart 120

```
*************************************-------------------------------
* ON CAPTAIN (F/O) W & LD INDICATOR, *| GROUND EQUIPMENT REQUIRED   |
* NO ILLUMINATION OF LAND 3 CAPTION  *-------------------------------
* LIGHT WITH FD 2 AND AT 2 (AT 1)    *| DESCRIPTION        PART NO. |
* ENGAGED.                           *-------------------------------
**************************************| RADIO ALTIMETER             |
                                      | GROUND TEST UNIT            |
                                      -------------------------------

*****************************************************
* For test purposes, replace W & LD computer        *
* No.1 [7] (No.2 [8])                               *
* On Captain (F/O) W & LD indicator, check if LAND 3 *
* caption light illuminates.                        *
*****************************************************
    |   |
    |   |       --------------------------------------
    NO  YES------| Replace removed computer by the new one. |
    |           --------------------------------------
    |
    |           --------------------------------------
    |------------| Replace Autothrottle computer No.2 [15] |
                | (No.1 [29])                             |
                --------------------------------------
```

Chart 121

```
*************************************----------------------------------
* ON CAPTAIN (F/O) W & LD INDICATOR, *| GROUND EQUIPMENT REQUIRED     |
* LAND 3 CAPTION LIGHT REMAINS        *--------------------------------
* ILLUMINATED                         *| DESCRIPTION       PART NO.   |
* FOLLOWING HYDRAULIC PRESSURE DROP.  *--------------------------------
*************************************| RADIO ALTIMETER               |
                                     | GROUND TEST UNIT              |
                                      --------------------------------

*****************************************************
* Reset circuit breaker [9] ([5]).                  *
* Trip circuit breaker [5] ([9]).                   *
* W & LD computer No.2 only being operative,        *
* with radio altitude equal to 1600 feet,           *
* restore LAND 3 capability requirements.           *
* On RELAY JACK unit,                               *
* Check if, on operating GREEN ONLY-NORM-BLUE       *
* ONLY switch from NORM to BLUE ONLY position,      *
* LAND 3 caption light extinguishes on F/O (Captain) *
* W & LD indicator.                                 *
*****************************************************
    |   |
    |   |    -------------------------------------------------------
    NO  YES--| Replace W & LD computer No.1 [7] (No.2 [8])         |
    |        -------------------------------------------------------
    |
    |        -------------------------------------------------------
    |--------| Replace relay jack hydraulic supply selector        |
             | unit.                                               |
             -------------------------------------------------------
```

Chart 122

```
***************************************-------------------------------
* LAND 2 AND LAND 3 CAPTION LIGHTS    *| GROUND EQUIPMENT REQUIRED  |
* DO NOT EXTINGUISH ON CAPTAIN (F/O) *-------------------------------
* W & LD INDICATOR ON SETTING OF      *| DESCRIPTION       PART NO. |
* FLIGHT CONTROLS TO MECHANICAL MODE.*-------------------------------
***************************************| RADIO ALTIMETER            |
                                       | GROUND TEST UNIT           |
                                       ------------------------------

*****************************************************
* Reset circuit breaker [9] ([5]).                  *
* Trip circuit breaker [5] ([9])                    *
* W & LD computer No.2 only being active,           *
* with radio altitude equal to 1600 feet,           *
* restore LAND 3 capability requirements.           *
* On flight control unit, check if on placing       *
* successively O & M ELEVONS, IN ELEVONS, and       *
* RUDDER selector switches in MECH position, F/O    *
* (Captain) W & LD indicator LAND 2 and LAND 3      *
* caption lights extinguish.                        *
*****************************************************
    |   |
    |   |       -----------------------------------------------------
    NO  YES-------| Replace W & LD computer No.1 [7] (No.2 [8]).   |
    |               -----------------------------------------------------
    |
    |               -----------------------------------------------------
    |-------------| Ref. 27-10-00 Trouble Shooting relating to       |
                  | Flight Controls, Test No.2, step 02.             |
                  -----------------------------------------------------
```

Chart 123

```
************************************-------------------------------
* LAND 3 CAPTION LIGHT DOES NOT     *| GROUND EQUIPMENT REQUIRED  |
* EXTINGUISH ON CAPTAIN (F/O) W & LD *-------------------------------
* INDICATOR, ON ERROR IN DISPLAY OF *| DESCRIPTION      PART NO. |
* RUNWAY HEADING.                    *-------------------------------
************************************| RADIO ALTIMETER             |
                                    | GROUND TEST UNIT            |
                                     -------------------------------

******************************************************
* Check that Captain and F/O HSIs display headings   *
* of different values.                               *
* For test purposes, replace W & LD computer No.1    *
* [7] (No.2 [8]).                                    *
* Check on Captain (F/O) W & LD indicator if LAND 3  *
* caption light extinguishes.                        *
******************************************************
    |   |
    |   |
    NO  |              -----------------------------------------------
    |   YES-------| Replace removed computer by the new one.        |
    |                  -----------------------------------------------
    |
    |                  -----------------------------------------------
    |-------------| Replace Inertial Signal Comparator Unit [31]    |
                       -----------------------------------------------
```

Chart 124

```
*************************************-------------------------------
* ON CAPTAIN (F/O) W & LD INDICATOR, *| GROUND EQUIPMENT REQUIRED   |
* LAND 3 CAPTION LIGHT DOES NOT      *-------------------------------
* EXTINGUISH ON FAILURE OF ISCU.     *| DESCRIPTION        PART NO. |
*************************************-------------------------------
                                     | RADIO ALTIMETER              |
                                     | GROUND TEST UNIT             |
                                     -------------------------------

****************************************************
* On F/O instrument panel, check if COM indicator  *
* light is illuminated.                            *
****************************************************
    |   |
    |   |
    |   |              ---------------------------------------------
    NO  YES-------| Replace W & LD computer No. 1 [7]              |
    |                  ---------------------------------------------
    |                  ---------------------------------------------
    |-------------| Replace Inertial Signals Comparator Unit [31]. |
                       ---------------------------------------------

****************************************************
* Procedure for W & LD system lane 2.              *
* Replace W & LD computer No.2 [8]                 *
* Check if LAND 3 caption light extinguishes.      *
****************************************************
    |
    |
    |          ------------------------------------------------------
    NO-------| Replace Inertial Signals Comparator Unit [31].       |
               ------------------------------------------------------
```

Chart 125

```
*************************************-------------------------------
* ON CAPTAIN (F/O) W & LD INDICATOR, *| GROUND EQUIPMENT REQUIRED  |
* LAND 3 CAPTION LIGHT DOES NOT      *-------------------------------
* EXTINGUISH ON LOSS OF THE ONLY     *| DESCRIPTION        PART NO. |
* FD ENGAGED.                        *-------------------------------
*************************************| RADIO ALTIMETER             |
                                     | GROUND TEST UNIT            |
                                     -------------------------------

*****************************************************
* For test purposes, replace W & LD computer        *
* No.1 [7] (No.2 [8]).                              *
* On Captain (F/O) W & LD indicator, LAND 3 caption *
* light extinguishes on disengagement.              *
* of FD 2 switch.                                   *
*****************************************************
    |   |
    |   |     ----------------------------------------------
   NO  YES-------| Replace removed computer by the new one.    |
    |             ----------------------------------------------
    |
*****************************************************
* For test purposes, replace AP/FD azimuth computer *
* No.1 [18].                                        *
* Check if LAND 3 caption light extinguishes        *
* on disengagement of FD 2 switch.                  *
*****************************************************
    |   |
    |   |     ----------------------------------------------
   NO  YES-------| Replace removed computer by the new one.    |
    |             ----------------------------------------------
    |
    |             ----------------------------------------------
    |------------| Replace AP/FD azimuth computer No.2 [20].   |
                  ----------------------------------------------
```

Chart 126

```
*************************************-------------------------------
* ON CAPTAIN (F/O) W & LD INDICATOR, *| GROUND EQUIPMENT REQUIRED  |
* LAND 2 AND 3 CAPTION LIGHTS        *-------------------------------
* DO NOT EXTINGUISH                  *| DESCRIPTION       PART NO. |
* WITH ONLY AT 2 (AT 1) LANE ENGAGED,*-------------------------------
* WHEN CHANGING FROM IAS ACQ MODE TO *| RADIO ALTIMETER            |
* IAS HOLD MODE                      *| GROUND TEST UNIT           |
*************************************-------------------------------

*****************************************************
* For test purposes, replace W & LD computer No.1   *
* [7] (No.2 [8]).                                   *
* AT No.2 (AT No.1) being engaged in IAS ACQ mode,  *
* check on Captain (F/O) W & LD indicator if LAND 2 *
* and LAND 3 caption lights extinguish when changing *
* from IAS ACQ mode.                                *
* to IAS HOLD mode.                                 *
*****************************************************
    |   |
    |   |        ------------------------------------------------
    NO  YES------| Replace removed computer by the new one.     |
    |            ------------------------------------------------
    |            ------------------------------------------------
    |            | Replace Autothrottle computer No.2 [15]      |
    |------------| (No.1 [29]).                                 |
                 ------------------------------------------------
```

Chart 127

ON CAPTAIN (F/O) W & LD INDICATOR LAND 2 AND LAND 3 CAPTION LIGHTS DO NOT EXTINGUISH WITH ONLY AT No.1 (AT No.2) CHANNEL ENGAGED, WHEN CHANGING FROM IAS ACQ MODE TO IAS HOLD MODE	GROUND EQUIPMENT REQUIRED	
	DESCRIPTION	PART NO.
	RADIO ALTIMETER SIMULATOR	

For test purposes, replace W & LD computer No.1 [7] (No.2 [8]).
AT 1 (AT 2) being engaged in IAS ACQ mode, check on Captain (F/O) W & LD indicator if LAND 2 and LAND 3 caption lights extinguish when changing from IAS ACQ to IAS HOLD mode.

- YES → Replace removed computer by the new one.
- NO → Replace Autothrottle computer No.1 [29] (No.2 [15]).

Chart 128

```
*************************************--------------------------------
* WITH ONE AUTOTHROTTLE ENGAGED IN   *| GROUND EQUIPMENT REQUIRED   |
* IAS ACQ MODE, UPON GLIDE BEAM CAP- *--------------------------------
* TURE, ONLY LAND 3 CAPTION LIGHT ON *| DESCRIPTION         PART NO. |
* CAPTAIN (F/O) W & LD INDICATOR     *--------------------------------
* EXTINGUISHES.                      *| RADIO ALTIMETER             |
*************************************| GROUND TEST UNIT            |
                                     | VOR-ILS GROUND              |
                                     | TEST UNIT                   |
                                     -------------------------------

****************************************************
* Replace W & LD computer No.1 [7] (No.2 [8]).     *
* Simulate GLIDE beam capture conditions. Check that*
* after the 14 seconds interval, LAND 3 caption    *
* light on Captain (F/O) W & LD indicator remains  *
* illuminated.                                     *
****************************************************
     |          |
     |          |  ----------------------------------------------------
     NO         YES-| Replace removed computer by the new one.        |
     |             ----------------------------------------------------
     |
****************************************************
* Replace AP/FD pitch computer No.1 [17] (No.2 [19])*
* Simulate GLIDE beam capture conditions. Check as *
* above that LAND 3 remains illuminated.           *
****************************************************
     |          |
     |          |  ----------------------------------------------------
     NO         YES-| Replace removed computer by the new one.        |
     |             ----------------------------------------------------
     |
     |             ----------------------------------------------------
     --------------| Replace AP/FD pitch computer No.2 [19] (No.1     |
                   | [17]).                                           |
                   ----------------------------------------------------
```

Chart 129

```
***************************************-------------------------------
* ON CAPTAIN (F/O) W & LD INDICATOR   *| GROUND EQUIPMENT REQUIRED   |
* NO ILLUMINATION OF DH CAPTION LIGHT*-------------------------------
* ON ALTITUDE DISCREPANCY.            *| DESCRIPTION        PART NO. |
* *************************************-------------------------------
                                       | MULTIMETER                  |
                                       -------------------------------

*******************************************************
* Check if Captain and F/O ADIs' DH caption lights    *
* are illuminated.                                    *
*******************************************************
     |   |
     |   |        ----------------------------------------
     |   |        | Refer to Trouble Shooting relating to |
    YES NO--------| transceiver.                          |
     |            | Ref. 34-42-00                         |
     |            ----------------------------------------
     |
******************************************************
* For test purposes, replace W & LD computer No.1    *
* [7] (No.2 [8]).                                    *
* On Captain (F/O) W & LD indicator check if DH      *
* caption light is illuminated.                      *
******************************************************
     |   |
     |   |        ----------------------------------------
    NO  YES-------| Replace removed computer by the new one. |
     |            ----------------------------------------
     |
*****************************************************
* Remove W & LD computer No.1 [7] (No.2 [8]).       *
* On rack connector 1C188 BA (2C188 BA), check      *
* if voltage between pins 12  and 13 (ground) is    *
* + 28 VDC.                                         *
*****************************************************
     |   |
     |   |        ----------------------------------------
    YES NO--------| Replace transceiver No.1 [26] (No.2 [27]) |
     |            ----------------------------------------
     |
     |            ----------------------------------------
     |------------| Replace diode [33] ([34]).            |
                  ----------------------------------------
```

Chart 130

```
************************************
* ON CAPTAIN (F/O) W & LD INDICATOR, *
* DH CAPTION LIGHT REMAINS ILLUMI-   *
* NATED, ALTHOUGH ALTITUDE DISCRE-   *
* PANCY IS NULL.                     *
************************************

*****************************************************
* For test purposes, replace W & LD computer No.1 [7]*
* (No.2 [8]).                                       *
* Check on Captain (F/O) W & LD indicator if DH     *
* caption light is extinguished.                    *
*****************************************************
     |   |
     |   |      -----------------------------------------------
     NO  YES-------| Replace removed computer by the new one.     |
     |              -----------------------------------------------
     |              -----------------------------------------------
     |-------------| Replace transceiver No.1 [26] (No.2 [27]).   |
                    -----------------------------------------------
```

Chart 131

```
*************************************-------------------------------
* ON CAPTAIN (F/O) W & LD INDICATOR  *| GROUND EQUIPMENT REQUIRED  |
* NO ILLUMINATION OF F CAPTION LIGHT *-------------------------------
* FOLLOWING GLIDE AND LOC CAPTURES,  *| DESCRIPTION       PART NO. |
* WITH AP 1 (2) ENGAGED IN LAND MODE.*-------------------------------
*************************************| VOR/ILS GROUND             |
                                     | TEST UNIT                  |
                                     -------------------------------

*******************************************************
* For test purposes, replace W & LD indicator         *
* No.1 [7] (no.2 [8]).                                *
* Check if Captain (F/O) W & LD indicator F caption   *
* light illuminates 14 seconds after capture of LOC   *
* and GLIDE beams.                                    *
*******************************************************
    |   |
    |   |    ------------------------------------------
   NO  YES-------| Replace removed computer by the new one.  |
    |            ------------------------------------------
    |
    |            ------------------------------------------
    |------------| Replace relevant AP/FD pitch computer No.1 |
                 | [17] (No.2 [19]).                          |
                 ------------------------------------------
```

Chart 132

```
**************************************-----------------------------
* ON EACH W & LD INDICATOR,           *| GROUND EQUIPMENT REQUIRED |
* NO ILLUMINATION OF THE LOWER        *----------------------------
* EXCESSIVE BEAM DEVIATION BAR AND    *| DESCRIPTION      PART NO. |
* THE AIRCRAFT SYMBOL,                *----------------------------
* WITH AIRCRAFT ABOVE GLIDE BEAM.     *| RADIO ALTIMETER           |
***************************************| GROUND TEST UNIT          |
                                       | VOR/ILS GROUND            |
                                       | TEST UNIT                 |
                                       -----------------------------

******************************************************
* For test purposes, replace W & LD computer No.1    *
* [7] (No.2 [8]).                                    *
* Repeat operation at which defect was encountered   *
* Check if when the aircraft is above Glide beam,    *
* the lower excessive beam deviation bar and the     *
* aircraft symbol illuminate on each W & LD          *
* indicator.                                         *
******************************************************
     |   |
     |   |
     |   |        ---------------------------------------------
    NO  YES-------| Replace removed computer by the new one.   |
     |            ---------------------------------------------
     |
******************************************************
* Simulate a LOC beam deviation to the right or      *
* to the left.                                       *
* Check if associated excessive beam deviation       *
* illuminates on each W & LD indicator.              *
******************************************************
     |   |        ---------------------------------------------
    NO  YES-------| Replace AP/FD pitch computer No.1 [17]     |
     |            | (No.2 [19]).                               |
     |            ---------------------------------------------
     |
******************************************************
* For test purposes, replace AP/FD azimuth computer  *
* No.1 [18].                                         *
******************************************************
     |   |        ---------------------------------------------
    NO  YES-------| Replace removed computer by the new one.   |
     |            ---------------------------------------------
     |            ---------------------------------------------
     |------------| Replace AP/FD azimuth computer No.2 [20].  |
                  ---------------------------------------------
```

Chart 133

```
*************************************-------------------------------
* ON LANE 1 (LANE 2) LOC FAILURE,    *| GROUND EQUIPMENT REQUIRED  |
* WITH GLIDE MODE ENGAGED :          *-------------------------------
* NO FLASHING OF LOC DEVIATION BAR   *| DESCRIPTION        PART NO. |
* AND AIRCRAFT SYMBOL                *-------------------------------
* ON EACH W & LD INDICATOR           *| VOR/ILS GROUND             |
*************************************| TEST UNIT                  |
                                     | RADIO ALTIMETER            |
                                     | GROUND TEST UNIT           |
                                     -------------------------------

*****************************************************
* Repeat operation at which defect was encountered : *
* height above 600 feet - AP1 (AP2) switch engaged   *
* GLIDE mode selected - Captain (F/O) RAD/INS switch *
* [39] ([40]) in INS position.                       *
* LOC capture is obtained.                           *
*****************************************************
    |   |
    |   |
    |   |         ------------------------------------------------
    NO  YES-------| Replace Captain (First Officer) RAD/INS      |
    |             | switch [39] ([40]).                          |
    |             ------------------------------------------------
    |
****************************************************
* Replace W & LD computer No.1 [7] (No.2 [8]).     *
* Repeat beam capture operation. LOC beam is       *
* captured.                                        *
****************************************************
    |          |
    |          |  ------------------------------------------------
    NO         YES-| Replace removed computer by the new one.    |
    |              ------------------------------------------------
    |
    |             ------------------------------------------------
    --------------| Replace AP/FD azimuth computer No.1 [18] (No.2 |
                  | [20]).                                       |
                  ------------------------------------------------
```

Chart 134

```
*************************************-----------------------------------
* ON LOC FAILURE, WITH LAND MODE     *| GROUND EQUIPMENT REQUIRED      |
* ENGAGED, NO FLASHING OF            *-----------------------------------
* LOC DEVIATION BAR ON EACH W & LD   *| DESCRIPTION          PART NO.  |
* INDICATOR.                         *-----------------------------------
**************************************| VOR/ILS GROUND                 |
                                      | TEST UNIT                      |
                                      | RADIO ALTIMETER                |
                                      | GROUND TEST UNIT               |
                                      ----------------------------------

*****************************************************
* For test purposes, replace W & LD computer No.1   *
* [7] (No.2 [8])                                    *
* Check if LOC beam excessive deviation bars are    *
* flashing.                                         *
*****************************************************
    |   |
    |   |        ---------------------------------------------------
    NO  YES-------| Replace removed computer by the new one.        |
    |            ---------------------------------------------------
    |
****************************************************
* Select radio altitude 800 feet. On W & LD test   *
* connectors ZA and ZB, measure voltage between    *
* terminals ZA17 and ZA61 (ground) then ZB18 and   *
* ZB61 (ground). Check that this is 7.5 VDC.       *
****************************************************
    |          |
    |          |     ---------------------------------------------------
    NO         YES-| Replace AP/FD azimuth computer No.1 [18] (No.2 |
    |              | [20]).                                          |
    |              ---------------------------------------------------
    |
    |              ---------------------------------------------------
    --------------| Replace radio altimeter No.1 [26] (No.2 [27]).  |
                   ---------------------------------------------------
```

Chart 135

```
**************************************-------------------------------
* ON LOC FAILURE, IN LAND MODE,       *| GROUND EQUIPMENT REQUIRED  |
* NO CANCELLATION OF EITHER ROLL      *-------------------------------
* OR YAW FD BAR ON EACH ADI           *| DESCRIPTION        PART NO. |
**************************************-------------------------------
                                       | VOR/ILS GROUND              |
                                       | TEST UNIT                   |
                                       | RADIO ALTIMETER             |
                                       | GROUND TEST UNIT            |
                                       -------------------------------

*******************************************************
* FD 2 switch being disengaged, place Captain and    *
* F/O switches FD1/FD2 in FD2 position.              *
* Check if both FD bars disappear from each ADI.     *
*******************************************************
    |   |
    |   |         --------------------------------------------------
    NO  YES-------| Replace W & LD computer No.1 [7] (No.2 [8]).   |
    |             --------------------------------------------------
    |
    |             --------------------------------------------------
    |-------------| Replace relevant ADI, No.1 [41], or No.2 [42]. |
                  --------------------------------------------------
```

Chart 136

```
****************************************--------------------------------
* ON ILS RECEPTION FAILURE,            *| GROUND EQUIPMENT REQUIRED     |
* NO FLASHING OF GLIDE DEVIATION BAR   *--------------------------------
* ON EACH W & LD INDICATOR             *| DESCRIPTION        PART NO.   |
****************************************--------------------------------
                                        | VOR/ILS GROUND                |
                                        | TEST UNIT                     |
                                        | RADIO ALTIMETER               |
                                        | GROUND TEST UNIT              |
                                        ---------------------------------

*******************************************************
* For test purposes, replace W & LD computer No.1     *
* [7] (No.2 [8]).                                     *
* Check if GLIDE beam excessive deviation bars        *
* are flashing.                                       *
*******************************************************
    |   |
    |   |          ------------------------------------------------
    NO  YES--------| Replace removed computer by the new one.     |
    |              ------------------------------------------------
    |
    |              ------------------------------------------------
    |--------------| Replace ILS receiver No.1 [43] (No.2 [44]).  |
                   ------------------------------------------------
```

Chart 137

```
*************************************-----------------------------------
* ON LANE 1 (LANE 2) ILS RECEPTION   *| GROUND EQUIPMENT REQUIRED   |
* FAILURE,                            *-----------------------------------
* NO CANCELLATION OF PITCH FD BAR     *| DESCRIPTION        PART NO. |
* ON EITHER ADI                       *-----------------------------------
*************************************| VOR/ILS GROUND               |
                                     | TEST UNIT                    |
                                     | RADIO ALTIMETER              |
                                     | GROUND TEST UNIT             |
                                     -----------------------------------

*****************************************************
* Place the FD1/FD2 switch associated with the ADI   *
* on which the pitch bar still appears in FD2 (FD1)  *
* position.                                          *
* Check if pitch bar is removed.                     *
*****************************************************
      |   |
      |   |      ----------------------------------------------------
     NO  YES-------| Replace W & LD computer No.1 [7]                 |
      |            | (No.2 [8]).                                      |
      |            ----------------------------------------------------
      |
      |            ----------------------------------------------------
      |------------| Replace relevant ADI, No.1 [41], or              |
                   | (No.2 [42]).                                     |
                   ----------------------------------------------------
```

Chart 138

```
***************************************-------------------------------
* ON LANE 2 (LANE 1) LOC FAILURE      *| GROUND EQUIPMENT REQUIRED   |
* IN GLIDE MODE                       *-------------------------------
* NO FLASHING OF LOC DEVIATION BAR    *| DESCRIPTION        PART NO. |
* AND AIRCRAFT SYMBOL ON EACH         *-------------------------------
* W & LD INDICATOR.                   *| VOR/ILS GROUND              |
***************************************| TEST UNIT                   |
                                       | RADIO ALTIMETER             |
                                       | GROUND TEST UNIT            |
                                       -------------------------------

*****************************************************
* Disengage AP1 (AP2) switch.                       *
* Engage AP2 (AP1) switch, then restore the LOC and *
* GLIDE beam capture conditions at a height above   *
* 600 feet.                                         *
* F/O (Captain) RAD/INS switch [40] ([39]) in INS   *
* position.                                         *
* LOC capture is initiated.                         *
*****************************************************
    |   |
    |   |
    |   |   ------------------------------------------------------
   NO  YES-------| Replace F/O (Captain) RAD/INS switch [40]    |
    |            | ([39]).                                      |
    |            ------------------------------------------------------
    |
*****************************************************
* Disengage AP2 (AP1) switch. For test purposes,    *
* replace W & LD computer No.1 [7] (No.2 [8]).      *
* Engage AP1 (AP2) switch then restore GLIDE and    *
* LOC beam capture conditions at a height above     *
* 600 feet.                                         *
* F/O (Captain) RAD/INS switch [40] ([39]) switch in*
* INS position.                                     *
* Trip circuit breaker [11] ([12]).                 *
* Check if LOC excessive beam deviation bars are    *
* flashing.                                         *
*****************************************************
    |   |
    |   |   ------------------------------------------------------
   NO  YES-------| Replace removed computer by the new one.     |
    |            ------------------------------------------------------
    |
-----------------------------------------------------
* Replace W & LD computer No.2 [8] (No.1 [7]).      *
-----------------------------------------------------
```

Chart 139

```
*************************************------------------------------
* ON LANE 2 (LANE 1) ILS AND RADIO    *| GROUND EQUIPMENT REQUIRED |
* ALTIMETER RECEPTION FAILURE,        *-----------------------------
* NO FLASHING OF LOC AND GLIDE        *| DESCRIPTION      PART NO. |
* DEVIATION BARS AND AIRCRAFT SYMBOL *-----------------------------
* ON EACH W & LD INDICATOR.           *| VOR/ILS GROUND            |
**************************************| TEST UNIT                 |
                                      | RADIO ALTIMETER           |
                                      | GROUND TEST UNIT          |
                                      -----------------------------

*****************************************************
* For test purposes, replace W & LD computer No.1   *
* [7] (No.2 [8]).                                   *
* Check if LOC and GLIDE beam deviation bars        *
* and aircraft symbol are flashing.                 *
*****************************************************
    |   |
    |   |
    |   |          ----------------------------------------
    NO  YES-------| Replace removed computer by the new one. |
    |              ----------------------------------------
    |
******************************************************
* Set circuit breaker [38] ([37]). Select LAND mode. *
* Check if AP2 (AP1) switch is held in engaged       *
* position in spite of radio altimeter Lane 1 (Lane  *
* 2) being out of action as circuit breaker [50]     *
* ([49]) is tripped.                                 *
******************************************************
    |          |
    |          |   ----------------------------------------
    NO         YES-| Replace radio altimeter No.2 [27] (No.1 [26]). |
    |              ----------------------------------------
    |
    |              ----------------------------------------
    --------------| Replace ILS receiver No.2 [44] (No.1 [43]). |
                   ----------------------------------------
```

Chart 140

```
***************************************
* ON EACH ADI,                        *
* NO CANCELLATION OF THE THREE        *
* FD CONTROL BARS                     *
* IN PITCH HOLD MODE, AFTER GO        *
* AROUND INITIATION.                  *
***************************************

*******************************************************
* For test purposes, replace W & LD computer No.1     *
* [7] (No.2 [8]).                                     *
* Check if FD control bars are removed fron both      *
* ADIs.                                               *
*******************************************************
     |   |
     |   |
     |   |        --------------------------------------------------
    NO  YES-------| Replace removed computer by the new one        |
     |            --------------------------------------------------
     |
     |            --------------------------------------------------
     |------------| Replace AP/FD pitch computer No.1 [17]         |
                  | (No.2 [19]).                                   |
                  --------------------------------------------------
```

Chart 141

AUTOLAND WARNING LIGHTS DO NOT EXTINGUISH ON DISENGAGEMENT OF AP1 (AP2) SWITCH.

GROUND EQUIPMENT REQUIRED	
DESCRIPTION	PART NO.
VOR/ILS GROUND TEST UNIT	
RADIO ALTIMETER GROUND TEST UNIT	

* Press Captain AP instinctive disconnect switch
* Check if AUTOLAND warning lights extinguish.

- YES ------- Replace AFCS control unit [13].
- NO ------- Replace W & LD computer No.1 [7] (No.2 [8]).

Chart 142

```
***************************************-------------------------------
* NO FLASHING OF AUTOLAND WARNING     *| GROUND EQUIPMENT REQUIRED   |
* LIGHTS                              *-------------------------------
* ON FAILURE OF ADC COMPARISON        *| DESCRIPTION        PART NO. |
***************************************-------------------------------
                                       | VOR/ILS GROUND TEST         |
                                       | UNIT                        |
                                       | RADIO ALTIMETER             |
                                       | GROUND TEST UNIT            |
                                       -------------------------------

*****************************************************
* For test purposes, replace W & LD computer No.1   *
* [7] (No.2 [8]).                                   *
* Check if AUTOLAND warning lights are flashing.    *
*****************************************************
     |    |
     |    |       ----------------------------------------------
     NO   YES-------| Replace removed computer by the new one.  |
     |            ----------------------------------------------
     |
*****************************************************
* For test purposes, replace air data computer      *
* No.1 [45] (No.2 [46]).                            *
* Check if AUTOLAND warning lights are flashing.    *
*****************************************************
     |    |
     |    |       ----------------------------------------------
     NO   YES-------| Replace removed computer by the new one.  |
     |            ----------------------------------------------
     |
     |            ----------------------------------------------
     |--------------| Replace diode [47] ([48])                 |
                  ----------------------------------------------
```

Chart 143

```
***************************************------------------------------
* AUTOLAND WARNING LIGHTS              *| GROUND EQUIPMENT REQUIRED  |
* DO NOT EXTINGUISH ON                 *-----------------------------
* GO AROUND INITIATION                 *| DESCRIPTION       PART NO. |
***************************************------------------------------
                                        | VOR ILS GROUND TEST        |
                                        | UNIT                       |
                                        | RADIO ALTIMETER            |
                                        | GROUND TEST UNIT           |
                                        ------------------------------

*********************************************************
* Replace W & LD computer No.1 [7] (No.2 [8]). Repeat*
* operation. Check that the two AUTO LAND warning    *
* lights do not flash when GO AROUND is initiated.   *
*********************************************************
     |         |
     |         |  -----------------------------------------
    NO       YES-| Replace removed computer by the new one. |
     |            -----------------------------------------
     |
     |            -----------------------------------------
     |            | Replace AP/FD azimuth computer No.2 [20] (No.1 |
     ------------| [18]).                                    |
                  -----------------------------------------
```

Chart 144

```
*************************************-----------------------------------
* NO FLASHING OF AUTOLAND WARNING    *| GROUND EQUIPMENT REQUIRED      |
* LIGHTS, IN LAND MODE               *--------------------------------
* EITHER AT A RADIO ALTITUDE BELOW   *| DESCRIPTION          PART NO.  |
* 200 FT, WITH GLIDE BEAM DEVIATION, *--------------------------------
* OR AT A RADIO ALTITUDE BELOW       *| VOR/ILS GROUND                 |
* 100 FT, WITH LOC BEAM DEVIATION    *| TEST UNIT                      |
**************************************| RADIO ALTIMETER                |
                                      | GROUND TEST UNIT               |
                                      ---------------------------------

*******************************************************
* Check if associated excessive beam deviation bar    *
* illuminates                                         *
*******************************************************
    |   |
    |   |          -------------------------------------------------------
    NO  YES--------| Replace W & LD computer No.1 [7] (No.2 [8]).        |
    |              -------------------------------------------------------
    |
    |              -------------------------------------------------------
    |--------------| Refer to trouble shooting procedure relative to    |
                   | Excessive Beam Deviation Warning.                   |
                   -------------------------------------------------------
```

Chart 145

```
***************************************-------------------------------
* AUTOLAND WARNING LIGHTS             *| GROUND EQUIPMENT REQUIRED  |
* REMAIN ILLUMINATED                  *-----------------------------
* WHEN EITHER CAPTAIN OR F/O WARNING  *| DESCRIPTION       PART NO. |
* LIGHT IS PRESSED                    *-----------------------------
***************************************| VOR/ILS TEST              |
                                       | UNIT                      |
                                       | RADIO ALTIMETER           |
                                       | GROUND TEST UNIT          |
                                       -----------------------------

*****************************************************
* For test purposes, replace W & LD computer No.1   *
* [7] (No.2 [8]).                                   *
* Restore AUTOLAND warning triggering conditions.   *
* Press associated AUTOLAND warning light and       *
* check if both AUTOLAND warning lights extinguish  *
*****************************************************
     |   |
     |   |       ----------------------------------------------
     |   YES-----| Replace removed computer by the new one.   |
     |           ----------------------------------------------
     |
     |           ----------------------------------------------
     NO----------| Replace relevant AUTOLAND warning light,   |
                 | Captain [3] F/O [4]).                      |
                 ----------------------------------------------
```

Chart 146

```
**************************************----------------------------------
* NO FLASHING OF AUTOLAND WARNING    *| GROUND EQUIPMENT REQUIRED      |
* LIGHTS                             *----------------------------------
* ON LOSS OF EITHER LOC BEAM         *| DESCRIPTION          PART NO.  |
* OR GLIDE BEAM                      *----------------------------------
**************************************| VOR/ILS GROUND                 |
                                      | TEST UNIT                      |
                                      | RADIO ALTIMETER                |
                                      | GROUND TEST UNIT               |
                                      ----------------------------------

*****************************************************
* For test purposes, replace W & LD computer No.1   *
* [7] (No.2 [8]).                                   *
* Restore AUTOLAND warning triggering conditions    *
* on loss of GLIDE or LOC beam.                     *
* Check if the associated excessive beam deviation  *
* bars are flashing.                                *
*****************************************************
    |   |
    |   |        ----------------------------------------------
    NO  YES-------| Replace removed computer  by the new one.  |
    |            ----------------------------------------------
    |
    |            ----------------------------------------------
    |-------------| Refer to trouble shooting procedure relating to|
                 | ILS failure warning function.                   |
                 ----------------------------------------------
```

Chart 147

```
*************************************-------------------------------
* NO DISENGAGEMENT OF AP1 (AP2)     *| GROUND EQUIPMENT REQUIRED  |
* SWITCH AT A RADIO ALTITUDE BELOW  *-------------------------------
* 600 FEET WHEN G/S AND LOC FLAGS   *| DESCRIPTION       PART NO. |
* APPEAR ON ADI                     *-------------------------------
*************************************| VOR/ILS GROUND             |
                                     | TEST UNIT                  |
                                     | RADIO ALTIMETER            |
                                     | GROUND TEST UNIT           |
                                     -------------------------------

*****************************************************
* For test purposes, replace W & LD computer No.1   *
* [7] (No.2 [8]).                                   *
* Restore previous conditions so that G/S and       *
* LOC flags become visible                          *
* Check if AP1 (AP2) switch disengages.             *
*****************************************************
    |   |
    |   |       -------------------------------------------------
    NO  YES-----| Replace removed computer by the new one.      |
    |           -------------------------------------------------
    |
    |           -------------------------------------------------
    |-----------| Replace AP/FD pitch computer No.1 [17]        |
                | (No.2 [19]).                                  |
                -------------------------------------------------
```

Chart 148

```
************************************-----------------------------------
* NOT POSSIBLE TO ENGAGE AP1 (AP2)   *| GROUND EQUIPMENT REQUIRED     |
* SWITCH AT A RADIO ALTITUDE ABOVE   *-------------------------------
* 600 FEET IN LAND MODE, WITH ILS    *| DESCRIPTION          PART NO. |
* FAILURE                            *-------------------------------
*************************************| VOR/ILS GROUND                 |
                                     | TEST UNIT                      |
                                     | RADIO ALTIMETER                |
                                     | GROUND TEST UNIT               |
                                      -------------------------------

*****************************************************
* For test purposes, replace W & LD computer No.1   *
* [7] (No.2 [8]).                                   *
* Restore conditions for radio altitude above 600 ft*
* Engage AP1 (AP2) switch. The switch remains       *
* engaged.                                          *
*****************************************************
     |    |
     |    |      ------------------------------------------------------
     NO   YES-------| Replace removed computer by the new one.          |
     |              ------------------------------------------------------
     |
     |              ------------------------------------------------------
     |-------------| Replace radio altimeter transceiver No.1 [26]    |
                    | (No.2 [27]).                                       |
                    ------------------------------------------------------
```

Chart 149

```
*************************************----------------------------
* AP1 (AP2) SWITCH DOES NOT REMAIN IN*| GROUND EQUIPMENT REQUIRED |
* ENGAGED POSITION AT AN ALTITUDE    *----------------------------
* BELOW 600 FEET,                    *| DESCRIPTION       PART NO. |
* IN LAND MODE, WITH ILS GLIDE       *----------------------------
* TRANSMISSION FAILURE.              *| VOR/ILS GROUND             |
*************************************| TEST UNIT                  |
                                     | RADIO ALTIMETER            |
                                     | GROUND TEST UNIT           |
                                      ----------------------------

*****************************************************
* For test purposes, replace W & LD computer No.1 [7]*
* (No.2 [8]).                                        *
* Restore conditions for a radio altitude below      *
* 600 feet with loss of GLIDE beam transmission      *
* Check if AP1 (AP2) switch remains engaged.         *
*****************************************************
    |    |
    |    |      ----------------------------------------------
    NO   YES=======| Replace removed computer by the new one.      |
    |              ----------------------------------------------
    |
*****************************************************
* On ITEM control and display indicator, place       *
* FLIGHT-TEST ALL-TEST UNIT and IFM-OFF-TEST         *
* selector switches respectively in FLIGHT and IFM   *
* positions.                                         *
* De-energize INS No.1 (INS No.2), MSU selector      *
* switch in OFF position                             *
* Place side 1 (side 2) READ/CANCEL switch in        *
* READ position and check if ILS indication appears  *
* in upper left (right) window.                      *
*****************************************************
    |    |
    |    |      ----------------------------------------------
    NO   YES-------| Replace ILS receiver No.2 [44] (ILS No.1 [43]),|
    |              | then place READ/CANCEL switch in CANCEL        |
    |              | position in order to cancel ILS indication.    |
    |               ----------------------------------------------
    |
    |               ----------------------------------------------
    |--------------| Replace ILS receiver No.1 [43] (ILS No.2 [44]),|
                   | then cancel ILS indication in the same way     |
                    ----------------------------------------------
```

Chart 150

```
**************************************-----------------------------
* AP1 (AP2) SWITCH DOES NOT REMAIN    *| GROUND EQUIPMENT REQUIRED |
* IN ENGAGED POSITION, IN LAND MODE,  *-----------------------------
* AT A RADIO ALTITUDE BELOW 600 FT,   *| DESCRIPTION      PART NO. |
* WITH ILS LOC TRANSMISSION FAILURE   *-----------------------------
**************************************| VOR/ILS GROUND            |
                                      | TEST UNIT                 |
                                      | RADIO ALTIMETER           |
                                      | GROUND TEST UNIT          |
                                      -----------------------------

*****************************************************
* For test purposes, replace W & LD computer No.1   *
* [7] (No.2 [8]).                                   *
* Restore conditions for a radio altitude below     *
* 600 ft, with loss of LOC transmission             *
* Check if AP1 (AP2) switch remains engaged. IF     *
*****************************************************
    |   |
    |   |      ---------------------------------------------
    NO  YES-------| Replace removed computer by the new one.  |
    |              ---------------------------------------------
    |
*****************************************************
* Switch on LOC beam transmission.                  *
* Both LOC and GLIDE beam transmissions being       *
* active, place Captain (F/O) RAD/INS switch in INS *
* position.                                         *
* Check if AP1 (AP2) switch disengages.             *
*****************************************************
    |   |
    |   |      ---------------------------------------------
    NO  YES-------| Replace ILS receiver No.2 [44] (No.1 [43]). |
    |              ---------------------------------------------
    |
    |              ---------------------------------------------
    |-------------| Replace ILS receiver No.1 [43] (No.2 [44]). |
                   ---------------------------------------------
```

Chart 151

```
*************************************------------------------------
* NO DISENGAGEMENT OF AP1 (AP2)     *| GROUND EQUIPMENT REQUIRED  |
* SWITCH WHEN ALT FLAG APPEARS      *------------------------------
* IN LAND MODE AT A RADIO ALTITUDE  *| DESCRIPTION       PART NO. |
* ABOVE 600 FT.                     *------------------------------
*************************************| VOR/ILS GROUND             |
                                     | TEST UNIT                  |
                                     | RADIO ALTIMETER            |
                                     | GROUND TEST UNIT           |
                                     ------------------------------


*****************************************************
* Press Captain F/O radio altimeter TEST push-button *
* Check if AP1 (AP2) switch disengages.              *
*****************************************************
    |   |
    |   |      -------------------------------------------------
   NO  YES=======| Replace radio altimeter transceiver No.1 [26]  |
    |            | (No.2 [27]).                                   |
    |            -------------------------------------------------
*****************************************************
* For test purposes, replace W & LD computer         *
* No.1 [7] (No.2 [8]).                               *
* Restore conditions for engagement of AP1 and       *
* AP2 in LAND mode, at a radio altitude above        *
* 600 feet, with GLIDE beam captured.                *
* Trip circuit breaker [41] ([50]).                  *
* Check if AP1 (AP2) switch disengages.              *
*****************************************************
    |   |
    |   |      -------------------------------------------------
   NO  YES-------| Replace removed computer by the new one.       |
    |            -------------------------------------------------
    |
    |            -------------------------------------------------
    |------------| Replace radio altimeter transceiver No.1 [26]  |
                 | (No.2 [27]).                                   |
                 -------------------------------------------------
```

Chart 152

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	WIRING DIAGRAM
[1] Captain Warning and Landing Display indicator No.1		2-211	1C-189	Captain instrument panel	22-41-81 R/I	22-41-02 22-41-03 22-41-04 22-41-05
[2] F/O Warning and Landing Display indicator No.2		2-212	2C-189	F/O instrument panel	22-41-81 R/I	22-41-02 22-41-03 22-41-04 22-41-05
[3] Captain AUTOLAND warning light		3-211	1C-190	Glare-shield instrument panel		22-41-04
[4] F/O AUTO-LAND warning light		3-212	2C-190	Glare-shield instrument panel		22-41-04
[5] Circuit breaker 28 VDC		1-213	1C-192	Map Ref. P 13	24-50-00 R/I	22-41-01
[6] Circuit breaker 28 VDC		1-213	1C-193	Map Ref. P 14	24-50-00 R/I	22-41-01
[7] Warning and Landing Display computer No.1	215 BS	4-215	1C-188	Electronics Rack-LH	22-41-11 R/I	22-41-01 22-41-02 22-41-03 22-41-04 22-41-05 22-41-07
[8] Warning and Landing Display computer No.2	216 BS	4-216	2C-188	Electronics Rack-RH	22-41-11 R/I	22-41-01 22-41-02 22-41-03 22-41-04 22-41-05 22-41-07
[9] Circuit breaker 28 VDC		5-213	2C-192	Map Ref. B 11	24-50-00 R/I	22-41-01

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	WIRING DIAGRAM
[10] Circuit breaker 28 VDC		5-213	2C-193	Map Ref. B 12	24-50-00 R/I	22-41-01
[11] Circuit breaker 115 VAC		2-213	2C-191	Map Ref. F 16	24-50-00 R/I	22-41-01
[12] Circuit breaker 115 VAC		1-213	1C-191	Map Ref. F 4	24-50-00 R/I	22-41-01
[13] AFCS control unit		5-211	C1	Glare-shield instrument panel	22-11-21 R/I	22-41-02 22-41-03 22-41-04 22-41-05
[14] Auto-throttle computer No.2	216 BS	4-216	2C-171	Electro-nics Rack RH	22-31-11 R/I	22-41-02 22-41-05 22-41-07
[15] Captain AT instinctive disconnect push-button		9-211	1C-182	Throttle control lever No.1	22-31-63 R/I	22-41-02
[16] F/O AT instinctive disconnect push-button		9-211	2C-182	Throttle control lever No.4	22-31-63 R/I	22-41-02
[17] AP/FD pitch computer No.1	215 BS	4-215	1C-12	Electro-nics Rack LH	22-12-11 R/I	22-41-02 22-41-03 22-41-04 22-41-05 22-41-07
[18] AP/FD azimuth compu-ter No.1	215 BS	4-215	1C-13	Electro-nics Rack LH	22-13-11 R/I	22-41-02 22-41-03 22-41-04 22-41-05 22-41-07

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	WIRING DIAGRAM
[19] AP/FD pitch computer No.2	216 BS	4-216	2C-12	Electronics Rack RH	22-12-11 R/I	22-41-02 22-41-03 22-41-04 22-41-05 22-41-07
[20] AP/FD azimuth computer No.2	216 BS	4-216	2C-13	Electronics Rack RH	22-12-11 R/I	22-41-02 22-41-03 22-41-04 22-41-05 22-41-07
[21] Audio warning unit	216 DS	7-216	W-381	Electronics Rack RH	32-23-XX	22-41-02
[22] AP instinctive disconnect switch		8-211	1C-14	Captain handwheel	22-11-36	22-41-02
[23] AP instinctive disconnect switch		8-211	2C-14	Captain handwheel	22-11-36	22-41-02
[24] AP instinctive disconnect switch		4-212	1C-15	F/O handwheel	22-11-36	22-41-02
[25] AP instinctive disconnect switch		4-212	2C-15	F/O handwheel	22-11-36	22-41-02
[26] Transceiver No.1		131 Frame 38	1S-51	Lower Baggage Compartment	34-00-00 R/I	22-41-03 22-41-05 22-41-07

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	WIRING DIAGRAM
[27] Transceiver No.2		132 Frame 38	2S-51	Lower Baggage Compartment	34-00-00 R/I	22-41-03 22-41-05 22-41-07
[28] Circuit breaker 115 VAC		2-213	F4	Map Ref. F 7	24-50-00 R/I	
[29] Autothrottle computer No.1	215BS	4-215	1C171	Electronics Rack LH	22-31-11 R/I	22-41-02 22-41-07
[30] Relay Jack Hydraulic Supply selector unit		10-216	C298	Electronics Rack RH	27-34-72 R/I	22-41-05
[31] Inertial Signals Comparator unit	123BB	26-123	F1	AFT underfloor racking	34-00-00 R/I	22-41-05 22-41-07
[32] Compass coupler switching unit	123BB	26-123	F135	AFT underfloor racking	34-00-00 R/I	
[33] Diode		7-216	1S-62	Electronics rack RH	34-XX-XX	22-41-05
[34] Diode		7-216	2S-62	Electronics rack RH	34-XX-XX	22-41-05
[35] Circuit breaker 28 VDC		1-213	G-291	Map Ref. M16	24-50-00 R/I	
[36] Circuit breaker 28 VDC		3-213	G-296	Map Ref. D8	24-50-00 R/I	
[37] Circuit breaker 115 VAC		2-213	1R-25	Map Ref. G6	24-50-00 R/I	
[38] Circuit breaker 115 VAC		13-216	2R-25	Map Ref. E15	24-50-00 R/I	

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF.	
					MAINT. TOPIC	WIRING DIAGRAM
[39] RAD/INS switch-Captain		5-211	1F-24	Glare-shield instrument panel	34-XX-XX	22-41-07
[40] RAD/INS switch - F/O		5-211	2F-24	Glare-shield instrument panel	34-XX-XX	22-41-07
[41] Attitude Director Indicator No.1		2-211	1F-23	Captain instrument panel	34-00-00 R/I	
[42] Attitude Director Indicator No.2		2-212	2F-23	F/O instrument panel	34-00-00 R/I	
[43] ILS receiver No.1	215DS	7-215	1R-37	Electronics Rack LH	34-00-00 R/I	22-41-03 22-41-04 22-41-07
[44] ILS receiver No.2	216ES	5-216	2R-37	Electronics Rack RH	34-00-00 R/I	22-41-03 22-41-04 22-41-07
[45] Air Data computer No.1	216BS	6-215	1F-71	Electronics Rack LH	34-00-00 R/I	22-41-04 22-41-05
[46] Air Data computer No.2	216BS	6-216	2F-71	Electronics Rack RH	34-00-00 R/I	22-41-04 22-41-05
[47] Diode		6-215	1F-107	Electronics Rack LH	34-XX-XX	34-11-05
[48] Diode		6-216	2F-107	Electronics Rack RH	34-XX-XX	34-11-05

**ON A/C 001-001,

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	WIRING DIAGRAM
[49] Circuit breaker 115 VAC		2-213	1S-56	Map Ref. D7	24-50-00 R/I	
**ON A/C 002-007,						
[49] Circuit breaker 115 VAC		2-213	1S-56	Map Ref. D8	24-50-00 R/I	
**ON A/C ALL						
[50] Circuit breaker 115 VAC		13-216	2S-56	Map Ref. F19	24-50-00 R/I	

Component Identification
Table 101

WARNING AND LANDING DISPLAY - ADJUSTMENT/TEST

WARNING : MAKE CERTAIN THAT THE POSITIONS OF NOSE AND MAIN GEAR DOORS CORRESPOND WITH THE ACTUAL POSITIONS OF THE RESPECTIVE OPERATING HANDLES.
HANDLE LOCKED, INDICATOR PLATE SHOWING WHITE : DOORS CLOSED.
HANDLE LOCKED, INDICATOR PLATE SHOWING RED : DOORS OPEN.

MAKE CERTAIN THAT THE LANDING GEAR POSITION INDICATED ON THE GEARS POSITION INDICATING UNIT CORRESPONDS WITH THE ACTUAL POSITION OF THE LANDING GEAR.

BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.

MAKE CERTAIN THAT LANDING GEAR AND SHORTENING MECHANISM SAFETY DEVICES ARE IN POSITION.

1. General

CAUTION : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

There are two kinds of test

A. Operational Test

This test includes :

(1) Test of annunciator lights.

(2) Test of W & LD computers by means of the ITEM system.

(3) W & LD self-test.

B. Functional Test

This test includes :

(1) Operational test

(2) Test of AP warning

(3) Test of AT warning

(4) Test of ILS failure and excessive beam deviation indicator.

(5) Test of capability caption lights

(6) Test of DH caption light

B (7) Deleted

(8) Test of AUTOLAND warning lights

(9) Test of FD bar removal

(10) Test of AP/FD and AT disconnection

NOTE : Each test can be carried out independently, though work preparation is common to each kind of test.

2. Operational Test

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.47 m (14 ft. 8 in.)	
Electrical Ground Power Unit	

B. Prepare

(1) Make certain that the following circuit breakers are set :

	SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
	ENG 2	1-213	2E461	E 3
	ENG 3		3E 461	E 4
R R	NOSE UC WEIGHT SW "A" SYS SUP		G 291	M16
	LH UC WEIGHT SW "A" SYS SUP		G 292	M17
	AUDIO WARN SYS SUP 1		W 371	M21
	MWS SUP 1		W 252	N21
	ADC 1 28V SUP		1F 74	P12
	WARN & LDG DISPLAY 1 SUP 1		1C 192	P13
	WARN & LDG DISPLAY 1 SUP 2		1C 193	P14
	AT 1 CONT		1C 180	Q12
	AP/FD SYS 1 CONT		1C 17	Q13
	AFCS 1 CONT		1C 19	Q14
	AFCS TEST 1 28 V SUP		1C 383	R12
	ADC 1 26V SUP	2-213	1F 78	A 2
	AP/FD SYS 1 SUP		2C 20	F 4
	ADC 1 115V SUP		1F 73	F 3
	LDG DISPLAY SYS 1 SUP		1C 191	F 4
R	RH UC WEIGHT SW "B" SYS SUP	3-213	G 294	B 9
R	NOSE UC WEIGHT SW "B" SUP		G 296	D 8
	AP/FD SYS 2 CONT	5-213	2C 17	A11
	WARN & LDG DISPLAY 2 SUP 1		2C 192	B11
	WARN & LDG DISPLAY 2 SUP 2		2C 193	B12
	AUDIO WARN SYS SUP 2		W 372	C17
	ENG 1		1E 461	D 1
	ENG 4		4E 461	D 2

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
MWS SUP 2		W 251	D15
AFCS TEST 2 28 V SUP		2C 383	F11
AP/FD COMP 1 SUP	13-215	1C 18	A 5
AT SYS 1 SUP		1C 179	C 6
AT SYNCHRO SYS 1 SUP		1C 181	D 5
AFCS TEST 1 115 V SUP		1C 384	D 6
PLTS LT TEST SUP	15-215	L1001	E14
AP/FD SYS 2 SUP	13-216	2C 20	A17
LDG DISPLAY SYS 2 SUP		2C 191	F16
AFCS TEST 2 115 V SUP		2C 384	F17
AP/FD COMP 2 SUP		2C 18	F18

(2) Reset the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-216	X 345	G 4

(3) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

R (4) At Flight Engineer's station, on EQUIPMENT BAY COOLING panel, make certain that electronics rack ventilation
R is operating (Ref. 21-21-00).

(5) The aircraft must be on the ground, shock absorbers compressed.

(6) On centre console, on ADC control panel.

(a) Make certain that ADC1 TEST selector switch is in NORM position.

(b) Place ADC1 switch in ON position.

<u>NOTE</u> : If ADC1 caption light illuminates, reset by pressing caption light which must extin-

guish.

R C. Test of Annunciator Lights

R (1) On LH side console (panel 12-211), hold D/B LIGHT
R switch in TEST position.

R (a) On Captain's W & LD indicator, all lights must illuminate.

(b) On First Officer's W & LD indicator :

R AP and AT warning lights, excessive beam deviation bars and aircraft symbol must illuminate.

(c) On glareshield, both AUTOLAND warning lights must illuminate.

NOTE : The other lights which illuminate during this operation are not to be taken into account.

R (2) Release D/B LIGHT switch.

R (a) Above mentioned lights must extinguish.

R (3) On RH side console (panel 12-212), hold D/B LIGHT
R switch in TEST position.

R (a) On First Officer's W & LD indicator, all lights must illuminate.

(b) On Captain's W & LD indicator, AP and AT warning
R lights, excessive beam deviation bars, and air-
R craft symbol must illuminate.

(c) On glareshield, both AUTOLAND warning lights must illuminate.

NOTE : The other lights which illuminate during this operation are not to be taken into account.

R (4) Release D/B LIGHT switch.

R (a) Above mentioned lights must extinguish.

R D. Test of W & LD Computers by Means of the ITEM System

R NOTE : The W & LD computers are tested separately. Test
R procedure being identical for each computer, only
R computer No.1 test is described while information
R relating to computer No.2 is given in parentheses.

R (1) At Flight Engineer's station, on ITEM control and indicator panel.

(a) Place side 1 (2) ITEM-OFF-TEST selector switch in TEST position.

NOTE : This switch is of the pull-to-unlock type.

(b) Place FLIGHT-TEST ALL-TEST UNIT selector switch in TEST UNIT position.

(b1) ITEM indication must appear in window 3 (7) and TEST indication in window 4 (8).

(b2) The ITEM system autotest is initiated and approximately 3 minutes later, the following indications must be displayed :

- ITEM in window 3 (7)
- PASS in window 4 (8)

R NOTE : If ITEM self test is ineffective, the following indications must be displayed :

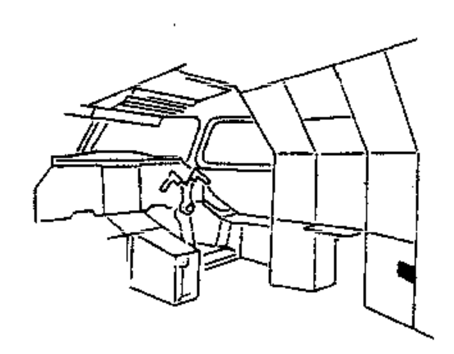
- ITEM in window 3 (7)
- FAIL in window 4 (8)

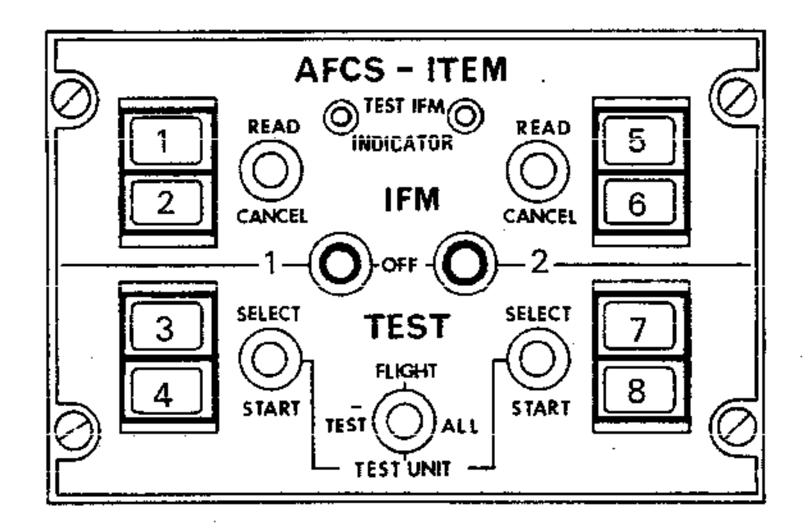
In such case, the test of W & LD computer No.1 (No.2) cannot be carried out.

(c) Place and hold side 1 (side 2) SELECT/START switch in SELECT position ; release switch when WLD indication appears in window 3 (7).

R NOTE : Indications concerning the AFCS systems appear in the following sequence. SFC, AP.P, AP.A, AT, AS.P, AS.R, AS.Y, ET, WLD on indicator 3 (7).

(d) Hold side 1 (side 2) SELECT/START switch in START position then release it.





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ITEM Control and Indicator Panel
Figure 501

(d1) W & LD computer No.1 (No.2) test is initiated, the following indications must be displayed :

- WLD in window 3 (7)
- TEST in window 4 (8)

(d2) Approximately 5 seconds later, the following indications must be displayed :

- WLD in window 3 (7)
- PASS in window 4 (8)

NOTE : If computer test is ineffective, the indications displayed will be :
- WLD in window 3 (7)
- COMP in window 4 (8)

(e) Place side 1 (2) IFM-OFF-TEST switch in OFF position.

(e1) Make certain that WLD and PASS indications have disappeared from windows 3 and 4 (7 and 8).

(f) Place FLIGHT-TEST ALL-TEST UNIT switch in FLIGHT position.

E. W & LD System Test

NOTE : During this test, the GLIDE deviation bars do not illuminate (GLIDE data are not taken into account when the aircraft is below 100 ft.).

(1) Make certain that no warning is displayed on either (Captain's or First Officer's instrument panel) W & LD indicator, and that AP system and autothrottle system are not engaged.

(2) On Captain's W & LD indicator, press then hold TEST push-button.

(a) On indicator, the following lights must illuminate :

- AP, in steady red
- AT, in steady red
- Aircraft symbol in amber and LOC deviation bars in white.
- LAND 2 and LAND 3, in green.
- DH, in amber

(b) On First Officer's W & LD indicator, the following lights must illuminate.

- AP, in steady red
- AT, in steady red
- Aircraft symbol in amber and LOC deviation bars in white.

(c) On glareshield, both red AUTOLAND warning lights must illuminate steadily.

(d) Cavalry charge aural warning must sound for one second.

(3) Release TEST push-button

(a) All above mentioned lights must extinguish, except :

- Both red AP warning lights, which remain illuminated.
- Both red AT warning lights, which start flashing.

(b) Cavalry charge aural warning must sound.

(4) On Captain's control column, press AP DISC push-button.

(a) Both AP warning lights must extinguish.

(b) Cavalry charge aural warning must stop.

(5) On AFCS control unit, engage AT1 switch.

(a) Switch must remain engaged.

(b) Both AT warning lights must extinguish.

(6) On First Officer's W & LD indicator, repeat test by means of associated TEST push-button.

(a) On indicator, all lights must illuminate, except GLIDE deviation bars.

(b) On Captain's W & LD indicator, only AP and AT warning lights, aircraft symbol and LOC deviation bars must illuminate.

(c) Both AUTOLAND warning lights must illuminate.

(d) Cavalry charge aural warning must sound for one second.

(7) Release TEST push-button

(a) All lights must extinguish, except AP and AT warning lights, (AT warning lights must flash).

(b) Cavalry charge aural warning sounds.

(8) Press AP DISC push-button on First Officer control column to cancel AP warnings.

(9) Engage AT1 switch in order to cancel AT warnings.

<u>NOTE</u> : If conditions required for engagement of an AP channel are fulfilled check that AP warning is cancelled on engagement of this AP channel.

F. Close-Up

(1) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(2) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-216	X 345	G 4

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3. Functional Test

A. Equipment and Materials

DESCRIPTION	PART NO.
Electrical Ground Power Unit	
R VOR/ILS Ground Test Unit (TIC or Similar)	
Radio Altimeter Ground Test Unit (TRT-AHV5-O 18)	
Ground Service Telephone	
Circuit Breaker Safety Clips	

NOTE : The TIC ground test unit is mentioned as an example : any equivalent radio unit may be used, provided it can be used for simultaneous simulation of GLIDE and LOC beam deviation.

B. Prepare

R NOTE : This work preparation is applicable to the test of both W & LD channels.

(1) Make certain that the following circuit breakers are set :

	SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
	ENG 2	1-213	2E 461	E 3
	ENG 3		3E 461	E 4
	NAV INS 1ST PLT SW SUP		1F 34	E15
	DEV 1 & 2 1ST PLT SW SUP		1R 38	G14
	ATT INS 1ST PLT SW SUP		1F 13	G16
R	RAD/INS 1 ST PLT SW SUP		1F 26	G17
	No.1 INPH SUP		R 89	K19
R R	NOSE UC WEIGHT SW "A" SYS SUP		G 291	M16
R	LH UC WEIGHT SW "A" SYS SUP		G 292	M17
	AT 1 CONT		1C 180	Q12
	AFCS 1 CONT		1C 19	Q14
	FD 1/FD 2 1ST PLT SW SUP		1C 27	Q15

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
RAD ALT 1 SUP	2-213	1S 56	D 8
ILS VHF NAV 1 SUP		1R 25	G 6
VOR VHF NAV 1 SUP		1R 33	G 7
R RH UC WEIGHT SW "B" SYS SUP	3-213	G 294	B 9
R NOSE UC WEIGHT SW "B" SUP		G 296	D 8
No.2 INPH SUP		R 90	H 2
AFCS 2 CONT	5-213	2C 19	A12
FD 1/FD 2 2ND PLT SW SUP		2C 27	A13
AT 2 CONT		2C 180	A14
ENG 1		1E 461	D 1
ENG 4		4E 461	D 2
AT SYS 1 SUP	13-215	1C 179	C 6
AT SYNCHRO SYS 1 SUP		1C 181	D 5
RAD ALT 1 & 2 IND	15-215	S 57	C 5
PLTS LT TEST SUP		L1001	E14
AT SYNCHRO SYS 2 SUP	13-216	2C 181	B17
AT SYS 2 SUP		2C 179	D16
VOR VHF NAV 2 SUP		2R 33	E14
R ILS VHF NAV 2 SUP		2R 25	E15
RAD ALT 2 SUP		2S 56	F19
R NAV INS 2ND PLT SW SUP	15-216	2F 34	C21
ATT INS 2ND PLT SW SUP		2F 13	D21
RAD/INS 2ND PLT SW SUP		2F 26	E21
DEV 1 & 2 2ND PLT SW SUP		2R 38	F21

(2) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

R (3) At Flight Engineer's station, on EQUIPMENT BAY COOLING panel, make certain that electronics rack ventilation is operating (Ref. 21-21-00).

R (4) Set flight controls in Blue or Green electrical mode (Ref. 27-00-00, Servicing).

R (5) Carry out work preparation of required for engagement of both AP/FDs (Ref. 22-10-00, Servicing).

R (6) Connect radio altimeter ground test unit to radio

altimeter No.1 (No.2).

(a) Make certain that Captain's and First Officer's radio altimeter indicators are not operating.

(b) Energize Captain's (First Officer's) radio altimeter ground test unit.

(c) On Captain's and First Officer's radio altimeter indicators, turn knob marked with a triangle
R clockwise and select a decision height of 0 ft.,
R indicated by the yellow triangleshaped pointer.
R Check that OFF flag mask and red flag disappear from both indicators.

(d) By means of radio altimeter ground test unit, on Captain's side (on First Officer's side), simulate an altitude of 1600 ft.

(7) At Flight Engineer's station, on INS No.3 MSU energize and align INS No.3 (Ref. 34-45-00, Adjustment/Test).

(8) On Captain's instrument panel, make certain that :

R (a) FD1/FD2 switch is in FD1 position.

(b) ATT INS 1/INS 3 switch is in ATT INS 1 position.

(c) COMP 1/COMP 2 switch is in COMP 1 position.

(d) DEV 1/DEV 2 switch is in DEV 1 position.

(e) NAV INS 1/INS 2 switch is in NAV INS 1 position.

(9) On First Officer's instrument panel, make certain that :

R (a) FD1/FD2 switch is in FD2 position.

(b) ATT INS 2/INS 3 switch is in ATT INS 2 position.

(c) COMP 1/COMP 2 switch is in COMP 2 position.

(d) DEV 1/DEV 2 switch is in DEV 2 position.

(e) NAV INS 1/INS 2 switch is in NAV INS 2 position.

R (10) On panel 5-211

(a) On AFCS control unit, select a runway heading of 0 degrees by means of the two VOR/LOC knobs.

(b) Place both RAD-INS switches in RAD position.

(c) On both VOR/ILS/DME control units, select ILS frequency of VOR/ILS ground test unit.

(11) The aircraft must be on the ground, shock absorbers compressed.

R (12) On panel 9-211

R (a) Place ADC1 and ADC2 test selector switches in TEST
R 2 position.

R (b) Briefly press amber ADC1 and ADC2 warning lights.

R (13) Trip, safety and tag the following circuit breakers :

R (a) G292 on panel 1-213 (MAP REF. M17).

R (b) G294 on panel 3-213 (MAP REF. B9).

R (14) To remove effect of AP drifts during GLIDE captures,
R it is necessary to inhibit outer and inner loop in-
R tegrators. This is done by making the following con-
R nections on AP/FD computer test connectors.

R (a) Connect 1C12 terminal ZA83 and ZB83 to 1C13 ter-
R minal ZA 54.
R Interconnect 1C12 terminals ZA82, ZB82 and ZB89.
R interconnect 1C13 terminals ZA9 and ZA54.

R (b) Connect 2C12 terminals ZA83 and ZB83 to 2C13 ter-
R minal ZA54.

R Interconnect 2C12 terminals ZA82, ZB82 and ZB89.
R Interconnect 2C13 terminals ZA9 and ZA65.

NOTE : Test procedure being identical for each computer, only computer No.1 test is described while information relating to computer No.2 is given in parentheses.
Test results are read on the associated W & LD indicator, except for the excessive ILS beam deviation test, where the results are read on both indicators.
As the illumination of some lights is simultaneously controoled by both W & LD computers, provided they are power supplied, the 28V circuit breaker to the other channel must be tripped.
Each part of the test can be carried out inde-

pendently.

C. Preliminary Tests

(1) Carry out test of W & LD computers by means of ITEM system (Ref. Operational Test, paragraph D).

(2) Carry out test of lights and W & LD test (Ref. Operational Test, paragraph C and E).

D. AP Warnings

(1) On panel 5-213 (1-213) trip, safety, and tag circuit breaker 2C192 (1C192), map ref. B11 (P13).

(2) On AFCS control unit, engage AP1 (AP2) switch.

(a) This switch must remain engaged.

(3) Press then release AP DISC push-button on Captain's control column handwheel.

(a) AP1 (AP2) switch must disengage.

(b) On Captain (First Officer) W & LD indicator, red AP warning light must illuminate.

(c) Cavalry charge aural warning must sound for one second.

(4) Press then release AP DISC push-button on First Officer's control column handwheel.

(a) AP warning light must extinguish.

(5) Engage AP2 (AP1) switch

(a) Switch must remain engaged.

(6) Manually disengage AP2 (AP1) switch

(a) Red AP warning light must illuminate.

R (b) Cavalry charge aural warning must sound con-
R tinuously.
R

(7) On Captain's W & LD indicator, press AP warning light.

(a) AP warning light must extinguish.

R (b) Cavalry charge aural warning must stop.

(8) Engage AP2 switch, select LAND mode and engage AP1 switch.

(a) Both switches must remain engaged.

(9) Manually disengage AP2 switch.

(a) AP warning must not operate.

(10) Manually disengage AP1 switch.

(a) Red AP warning light must illuminate.

(b) Cavalry charge aural warning must sound.

(11) On First Officer's W & LD indicator press AP warning light.

(a) AP warning light must extinguish.

(b) Cavalry charge aural warning must stop.

(12) Reset circuit breaker 2C192 (1C192).

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E. AT Warnings

(1) On panel 5-213 (1-213), trip, safety, and tag circuit breaker 2C192 (1C192), map ref. B 11 (P13).

(2) On AFCS control unit, engage AT1 and AT2 switches.

(a) Both switches must remain engaged.

(3) On throttle control lever No.1, press then release instinctive disconnect push-button.

R (a) AT1 and AT2 switches must disengage.

(b) On Captain's (First Officer's) W & LD indicator, red AT warning light must flash.

(4) On throttle control lever No.4, press then release instinctive disconnect push-button.

(a) AT warning light must extinguish.

(5) Engage AT1 and AT2 switches, then manually disengage AT1 switch.

(a) AT warning must not operate.

(6) Manually disengage AT2 switch.

(a) Red AT warning light must flash

(7) On First Officer's W & LD indicator, press AT warning light.

(a) AT warning light must extinguish.

(8) Engage then manually disengage AT1 switch.

(a) Red AR warning light must flash

(9) On Captain's W & LD indicator, press AT warning light.

(a) AT warning light must extinguish.

R (10) On AFCS control unit, engage FD1 switch and select GLIDE mode.

(a) Prime indicator light located below GLIDE push-button must illuminate.

(11) Using VOR/ILS ground test unit, simulate GLIDE capture.

(a) GLIDE push-button must illuminate, and associated prime indicator light must extinguish.

R (12) On AFCS control unit, engage AP1 (AP2) switch.

R (a) Red AT warning light must flash.

R (13) Engage AT1 switch.

(a) AT warning light must extinguish.

R (14) Manually disengage AT1 switch.

R (a) Red AT warning light must flash

R (15) Place at least two throttle control levers in max thrust position.

(a) On AFCS control unit, GO AROUND indicator light must illuminate.

(b) AT warning light must extinguish.

R (16) Disengage FD1 and AP1 and cancel warnings.

R (17) Engage FD2 switch and select GLIDE mode.
Repeat operations described from paragraph 3. E. (11)
R through paragraph 3. E. (15).

(a) Results must be identical.

R (18) Disengage FD2 and AP2, cancel warnings and disconnect VOR/ILS ground test unit.

R (19) Reset circuit breaker 2C192 (1C192).

F. Excessive Beam Deviation and ILS Failure Indicators.

NOTE : Flashing of AUTOLAND warning lights occuring in some operations of the test shall be disregarded.
Press either warning light to cancel warning.
The standard position with reference to the GLIDE and LOC beams is inside the aircraft facing the runway.
Example : deviation to the left :
aircraft deviation to the left of LOC beam
upwards deviation :
aircraft deviation above GLIDE beam.

(1) Excessive beam deviation.

(a) On panel 5-213 (1-213), trip, safety and tag circuit breaker 2C193 (1C193), map. ref. B12 (P14).

(b) On Captain's (First Officer's) side, simulated altitude being 1600 feet approximately, using VOR/ILS ground test unit, simulate a maximum LOC deviation to the left nad a maximum deviation above GLIDE beam (Ref. NOTE).

(b1) On both ADIs, LOC and GS flags must be visible.

R (c) Engage FD1 (FD2), and select GLIDE mode.
R
R (c1) Switch must remain engaged.

(c2) VOR/LOC and GLIDE prime indicator lights must illuminate.

(d) Gradually decrease LOC deviation intil both LOC flags disappear from both ADIs.

(d1) On both W & LD indicators RH LOC deviation bar and aircraft symbol must illuminate.

(d2) On each ADI LOC scale, LOC pointer is in maximum RH position.

(e) Gradually decrease LOC deviation until LOC deviation bar and aircraft symbol extinguish. On each ADI, note LOC pointer position.

(e1) LOC pointer must be half a dot to the right of the centre mark.

(f) Gradually decrease GLIDE deviation until both GS flags disappear from both ADIs.

(f1) On both W & LD indicators, lower GLIDE deviation bar and aircraft symbol must illuminate.

(f2) On each ADI GLIDE scale, GLIDE pointer is in maximum low position.

(g) Gradually decrease GLIDE deviation until GLIDE deviation bar and aircraft symbol extinguish. On each ADI, note GLIDE pointer position :

(g1) GLIDE pointer must be half a dot below the centre mark.

(h) Gradually simulate a GLIDE deviation below beam until each ADI GLIDE pointer is approximately one dot above centre mark.

(h1) On both W & LD indicators, upper GLIDE deviation bar and aircraft symbol must be illuminated.

(i) Gradually simulate a LOC deviation to the right until, on each ADI, LOC pointer is approximately half a dot to the left of centre mark.

(i1) On both W & LD indicators LH side LOC deviation bar must be illuminated.

(j) On Captain's (First Officer's) side, simulate an
R altitude below 75 feet. On both W & LD indicators

(j1) GLIDE deviation bar must extinguish.

(j2) LOC deviation bar and aircraft symbol must remain illuminated.

(k) On panel 2-213, trip circuit breaker 1S56, map ref. D8.

(k1) On both W & LD indicators, GLIDE deviation bars must illuminate.

(l) Reset circuit breaker 1S56 and return simulated altitude to 1600 ft.

(2) ILS faults.

(a) Make certain that both radio altimeters are operating.

R (b) Engage AT1 and AP1 (AP2), select GLIDE mode and

R carry out GLIDE capture (but not LOC capture)
R using VOR/ILS ground test unit.

(b1) GLIDE push-button and VOR/LOC prime indicator light on AFCS control unit must be illuminated.

(c) With both RAD/INS switches in RAD position, place Captain (First Officer) RAD/INS switch in INS position.

(c1) On both W & LD indicators, LOC deviation bars and aircraft symbol must flash.

(d) Place Captain (First Officer) RAD/INS switch in RAD position.

(d1) LOC deviation bars and aircraft symbol must extinguish.

(e) On panel 2-213 (13-216), trip circuit breaker 1R25 (2R25) map Ref. G6 (E15).

(e1) On both W & LD indicators, LOC and GLIDE deviation bars and aircraft symbol must flash.

(f) Simulate an altitude less than 75 ft.

(f1) On reaching 75 ft, GLIDE deviation bars must extinguish.

(g) Return altitude to 1600 ft.

(g1) LOC and GLIDE deviation bars and aircraft symbol must flash.

(h) Disengage autothrottle and move throttle control levers to maximum thrust position.

(h1) On AFCS control unit, GO AROUND indicator light must illuminate and GLIDE and VOR/LOC push-buttons must extinguish.

(h2) LOC and GLIDE deviation bars and aircraft symbol must extinguish.

(i) Select PITCH HOLD mode, engage one autothrottle and select GLIDE mode.

(i1) PITCH HOLD and HDG HOLD push-buttons and

VOR/LOC and GLIDE prime indicator lights must illuminate. GO AROUND indicator light must extinguish.

(i2) Check that LOC and GLIDE deviation bars and aircraft symbol remain extinguished.

(j) Reset circuit breaker 1R25 (2R25).

(j1) GLIDE push-button must illuminate and GLIDE prime indicator light must extinguish.

(k) Using VOR/ILS ground test unit, carry out LOC capture and select LAND mode.

(k1) LAND push-button only on AFCS control unit is illuminated.

(l) Engage AP2 (AP1) switch.

(l1) This switch must remain engaged.

(m) On panel 13-216 (2-213), trip circuit breaker 2R25 (1R25), map ref. E15 (G6).

(m1) LOC and GLIDE deviation bars and aircraft symbol must not flash.

(n) On panel 13-216 (2-213), trip circuit breaker 2C191 (1C191), map ref. F16 (F4).

(n1) On both W & LD indicators, LOC and GLIDE deviation bars and aircraft symbol must flash.

(o) Reset circuit breakers 2R25 (1R25) and 2C191 (1C191).

(o1) LOC and GLIDE deviation bars and aircraft symbol must extinguish.

(p) Trip circuit breakers 1R25 and 2R25 on panels 2-213 and 13-216, map ref. G6 and E15 respectively.

(p1) On both W & LD indicators, LOC and GLIDE deviation bars must flash. Aircraft symbol must remain extinguished.

(q) Reset circuit breakers 1R25 and 2R25.

(q1) LOC and GLIDE deviation bars must extinguish.

R (r) Disengage autothrottle, both APs. and both FDs. Cancel AT and AP warnings.

(s) Reset circuit breaker 2C193 (1C193). Switch off VOR/ILS ground test unit.

G. Capability Indicators

(1) Override BUSBAR SPLIT condition by connecting pins ZA28 and ZA1 on socket of W & LD computer No.1 (No.2) front face. Make certain that ELECTRIC TRIM control unit switches 1 and 2 are engaged.

(2) On AFCS control unit, select an approach speed of 130 knots on SPEED SELECT counter, engage AT1 switch and select IAS ACQ mode.

(a) IAS ACQ mode push-button must illuminate.

(b) The throttle control levers must move to the max. thrust position.

(3) Engage AP1 and FD1 switches, select LAND mode and engage AP2 switch.

(a) The three switches must remain engaged.

(b) VOR/LOC, GLIDE, and LAND prime indicator lights must illuminate.

(c) On Captain's (First Officer's) W & LD indicator, LAND 2 and LAND 3 caption lights must illuminate.

(4) On ceiling panel, on RELAY JACK panel, place GREEN ONLY - NORM - BLUE ONLY selector switch in BLUE ONLY position.

(a) LAND 3 capability caption light must extinguish (LAND 2 capability caption light remains illuminated).

(5) Place selector switch in NORM position.

(a) LAND 3 capability caption light must illuminate

R
R (6) On test socket of W & LD computer No.1 (No.2) front face, disconnect ZA 28 and ZA 1 pins.

(a) LAND 3 capability caption light must extinguish.

(7) Connect pins ZA 28 and ZA 1.

(a) LAND 3 capability caption light must illuminate.

R (8) On panel 2-213, trip circuit breaker F4, map ref. F7.

(a) LAND 3 capability caption light must extinguish.

R (9) Reset circuit breaker F4.

(a) LAND 3 caption light must illuminate.

R (10) Disengage FD1 switch.

(a) LAND 3 capability caption light extinguishes.

R (11) Engage FD2 switch.

(a) LAND 3 capability caption light illuminates.

R (12) On ceiling panel, on flight control unit, place OUTER AND MIDDLE ELEVONS selector switch in MECH position.

(a) LAND 3 and LAND 2 capability caption lights must extinguish.

R (13) Place OUTER AND MIDDLE ELEVONS selector switch in BLUE position, and press then release associated RESET push-button.

(a) LAND 3 AND LAND 2 capability caption lights must illuminate.

R (14) Repeat test using INNER ELEVONS selector switch, then RUDDER selector switch in lieu of OUTER AND MIDDLE ELEVONS selector switch.

(a) The results must be identical.

R (15) The flight controls being set in electrical mode, disengage AT1 switch and cancel AT warning.

(a) LAND 3 and LAND 2 capability caption lights must extinguish.

R (16) Engage AT2 switch and select IAS ACQ mode.

(a) LAND 3 and LAND 2 capability caption lights must illuminate.

R (17) Disengage AP1 switch.

(a) LAND 3 capability caption light must extinguish (LAND 2 caption light remains illuminated).

R (18) Engage AP1 switch

(a) LAND 3 capability caption light must illuminate.

(19) Disengage AP 2 switch.

(a) LAND 3 capability caption light must extinguish.

(20) Engage AP 2 switch.

(a) LAND 3 capability caption light must illuminate.

(21) Using VOR/ILS ground test unit, perform GLIDE capture (GLIDE mode push button must illuminate). Wait approximately 20 seconds (end of flare low test).

(a) Make certain that there is no capability reduction LAND 3 capability caption light must remain illuminated.

(22) Perform LOC capture (LAND mode push button must illuminate).

(23) Select a course difference of 5° between the two VOR/LOC counters on AFCS control unit.

(a) LAND 3 capability caption light must remain illuminated.

(24) Cancel course difference.

(25) At Captain (First Officer) side, select an altitude between 300 and 600 ft.

(26) Select a course difference of 5°.

(a) LAND 3 capability caption light must extinguish.

(27) Cancel course difference.

(a) LAND 3 capability caption light must illuminate.

(28) Select an altitude below 300 ft.

(29) Select a course difference of 5°.

(a) LAND 3 capability caption light must remain illuminated.

(30) On panel 2-213 (13-216), trip circuit breaker 1S56 (2S56), map ref. D8 (F19).

(a) LAND 3 capability caption light must extinguish.

(31) Cancel course difference on both VOR/LOC counters,

reset circuit breaker 1S56 (2S56), and simulate an altitude of approximately 1000 feet.

(a) LAND 3 capability caption light must be illuminated.

R (32) On centre console, on ADC control panel, place ADC1 switch in OFF position.

(a) LAND 3 capability caption light must extinguish.

(b) On ELECTRIC TRIM control unit, switches 1 and 2 must disengage.

R (33) Place ADC1 switch in ON position and press ADC1 caption light.

(a) LAND 3 capability caption light must illuminate.

R (34) Engage ELECTRIC TRIM 1 and AT1 and select IAS ACQ mode. On ADC control panel, place ADC2 switch in OFF position.

(a) LAND 3 capability caption light must extinguish.

(b) On ELECTRIC TRIM control unit, switch 2 must disengage.

(35) Place ADC 2 switch in ON position and press ADC2 caption light.

(a) LAND 3 capability caption light must illuminate.

(36) Engage ELECTRIC TRIM 2.

R (37) At Flight Engineer's station, on INS No.3 MSU, place selector switch in OFF position.

(a) LAND 3 capability caption light must extinguish.

R (38) Disconnect pins ZA28 and ZA1, energize and align INS No.3, disengage both AP channels, FD and AT. Cancel AP and AT warnings.

H. DH Caption Lights

(1) On Captain's (First Officer's) radio altimeter indicator, select a decision height of 200 ft with the yellow triangular pointer.

(2) On Captain's (First Officer's) side, slowly decrease simulated altitude to 0 ft. On reaching 200 ft mark :

(a) On Captain's (First Officer's) W & LD indicator, DH caption light must illuminate.

(b) DH caption light must illuminate on both ADIs.

(3) On Captain's (First Officer's) radio altimeter indicator, press TEST push-button.

(a) On Captain's (First Officer's) W & LD indicator, DH caption light must remain extinguished as long as TEST push-button is pressed.

(4) Select a decision height of 0 ft on Captain's (First Officer's) radio altimeter indicator.

(a) DH caption lights must extinguish.

(5) On Captain's (First Officer's) side, simulate an altitude of approximately 1600 ft.

B I. Deleted
Deleted

J. AUTOLAND Warning Lights

(1) On panel 5-213 (1-213), trip circuit breaker 2C193 (1C193), map ref. B12 (P14).

(2) Simulated altitude being above 600 feet, on panel 2-213 (13-216) trip circuit breaker 1S56 (2S56) map ref. D8 (F19).

(3) On AFCS control unit, make certain that neither auto-throttle lane is engaged and engage FD1 switch. Select GLIDE mode.

(a) VOR/LOC and GLIDE prime indicator lights must illuminate.

(4) Using VOR/ILS ground test unit, carry out LOC and GLIDE capture.

(a) VOR/LOC and GLIDE push-buttons must illuminate.

(5) On AFCS control unit engage AP1 switch.

(a) AT warning light must flash.

(b) On glareshield, Captain's (First Officer's) AUTO-LAND warning light must flash.

(6) Engage AT1 switch.

(a) AT warning must stop.

(b) AUTOLAND warning light must continue to flash.

(7) Disengage AP1 switch and cancel AP warning.

(a) AUTOLAND warning light must extinguish.

(8) Reset circuit breaker 1S56 (2S56).

(9) Engage AP2 switch and select LAND mode.

(a) LAND push-button must illuminate.

(10) On centre console, on ADC control panel, place ADC1 or ADC2 selector switch in COMP position and simulate an altitude below 600 feet.

(a) On reaching 600 ft altitude, associated AUTOLAND warning light must flash.

(11) Place selector switch in NORM position.

(a) AUTOLAND warning light must continue to flash.

(12) Disengage AT channel, and push throttle control levers to max. thrust position.

(a) AUTOLAND warning light must extinguish.

(b) On AFCS control unit, GO AROUND indicator light must illuminate and LAND push-button must extinguish.

(c) AT warning must be triggered.

(13) Place throttle control levers in mid-way position, engage one AT lane, and select PITCH HOLD mode.

(a) PITCH HOLD and HDG HOLD push-buttons must illuminate.

(b) GO AROUND caption light must extinguish.

(c) AT warning must stop.

(14) Select LAND Mode.

(a) LAND push-button must illuminate.

(15) Simulated altitude being above 200 feet, using VOR/ILS ground test unit, simulate an excessive GLIDE deviation, then an excessive LOC deviation.

(a) AUTOLAND warning light must not illuminate.

(16) Cancel excessive GLIDE deviation and maintain excessive LOC deviation, and simulate an altitude between 200 ft and 100 ft.

(a) On reaching 200 feet, associated AUTOLAND warning light must flash.

(17) Cancel LOC deviation.

(a) AUTOLAND warning light must continue to flash.

(18) Press Captain's AUTOLAND warning light.

(a) Warning light must extinguish.

(19) Simulate an altitude below 100 feet and an excessive

GLIDE deviation.

(a) AUTOLAND warning light must not illuminate.

(20) Maintain GLIDE deviation and simulate an altitude between 200 ft and 100 feet.

(a) On reaching 100 ft, AUTOLAND warning light must flash.

(21) Cancel GLIDE deviation.

(a) AUTOLAND warning light must continue to flash.

(22) Press First Officer's AUTOLAND warning light.

(a) AUTOLAND warning light must extinguish.

(23) On VOR/ILS ground test unit, stop GLIDE beam transmission.

(a) AUTOLAND warning light must flash.

(24) Press either AUTOLAND warning light to cancel warning.

(25) Stop LOC beam transmission.

(a) AUTOLAND warning light must flash.

(26) Disengage AP2 switch and cancel AP warning.

(27) Disengage AT, and cancel AT warning.

(28) Increase simulated altitude to approximately 1600 feet.

(29) Reset circuit breaker 2C193 (1C193).

K. Removal of FD bars

(1) On Captain's instrument panel, place FD1/FD2 switch in FD1 (FD2) position.

(2) On First Officer's instrument panel, place FD1/FD2 switch in FD1 (FD2) position.

(3) With a simulated altitude of 1600 ft, engage FD1 (FD2) and AT1 switches, select LAND mode and carry out LOC and GLIDE captures using VOR/ILS ground test unit.

(a) LAND push-button must illuminate.

(b) On both ADIs, FD roll and pitch bars must be visible.

(4) Simulate an altitude of less than 100 ft.

(a) On reaching 100 ft the two yaw pointers must appear on ADIs.

(5) Return altitude to 1600 ft.

(a) The two yaw pointers must disappear.

(6) On panel 2-213 (13-216), trip, safety and tag circuit breaker 1R25 (2R25), map ref. G 6 (E15).

(a) On both ADIs, FD roll and pitch bars must disappear.

(7) Disengage AT and push throttle control levers to maximum thrust position.

(a) GO AROUND indicator light must illuminate and LAND push-button must extinguish on AFCS control unit.

(b) FD roll and pitch bars must re-appear.

(8) Disengage FD1 (FD2) switch, switch off VOR/ILS ground test unit, reset circuit breaker 1R25 (2R25) and return throttle control levers to mid-way position.

L. AP/FD and AT Disconnection

NOTE : AP/FD and AT disconnection resulting from ISCU monitoring in cruise and in approach was checked in the ISCU test (AIR FRANCE configurqtion only) (Ref. 34-46-00, Adjustment/Test).

(1) On AFCS control unit engage FD1 and AT1 switches (FD2 and AT2).

(a) These three switches must remain engaged.

(2) Select LAND mode.

(a) VOR/LOC, GLIDE, and LAND prime indicator lights must illuminate.

(3) Using VOR/ILS ground test unit, carry out GLIDE capture.

(a) GLIDE push-button must illuminate.

(b) VOR/LOC and LAND prime indicator lights must remain illuminated.

(4) On AFCS control unit, engage AP1 and AP2 switches.

(a) AP1 and AP2 switches must remain engaged.

(5) On panel 2-213 (13-216), trip circuit breaker 1S56 (2S56), map ref. D8 (F19).

(a) AP1 and FD1 (AP2 and FD2) switches must disengage.

(6) Reset circuit breaker 1S56 (2S56) and engage AP1 and FD1 (AP2 and FD2) switches.

(a) Both switches must remain engaged.

(7) On panel 2-213 (13-216), trip circuit breaker 1R25 (2R25), map ref. G6 (E15).
Simulate an altitude below 600 feet.

(a) On reaching 600 ft, AP1 and FD1 (AP2 and FD2) switches must disengage.

(8) Reset circuit breaker 1R25 (2R25), and engage switches AP1 and FD1 (AP2 and FD2).

(a) Both switches must remain engaged.

(9) Disengage AT, and push throttle control levers to maximum thrust position.

(a) GO AROUND indicator light must illuminate.

(b) LAND push-button must extinguish.

(10) Trip circuit breaker 1R25 (2R25).

(a) AP1 and FD1 (AP2 and FD2) switches must remain engaged.

(11) Reset circuit breaker 1R25 (2R25), select PITCH HOLD mode, place throttle control levers in mid-way position, engage AT1 (AT2) switch, and select LAND mode.

(a) LAND push-button must illuminate.

(12) At Flight Engineer's station, on INS No.1 (INS No.2) MSU, place selector switch in OFF position.

(a) AT1, AP1, and FD1 (AT2, AP2, and FD2) switches must disengage.

(13) Disengage AP2 (AP1) switch and cancel AP and AT warnings.

(14) Energize and align INS No.1 (INS No.2).

(15) Increase simulated altitude to approximately 1600 ft.

M. Close-Up

(1) Carry out close up for engagement of both APs and both FDs (Ref. 22-10-00, Servicing).

(2) Switch off both radio altimeters and disconnect radio altimeter ground test unit.

(3) At Flight Engineer's station, on INS No.3 MSU, place selector switch in OFF position.

(4) Reset circuit breakers G291 and G296 respectively on panels 1-213 and 3-213, map ref. M16 and D8.

(5) De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, Servicing).

(6) Place ADC1 and ADC2 test selector switches in NORM position.

WARNING AND LANDING DISPLAY COMPUTER - REMOVAL/INSTALLATION

1. General

WARNING : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

W & LD computers 1C 188 and 2C 188 are installed respectively on shelves 4-215 and 4-216 in electronics racks. Locating pins are provided on connectors so that computer replacement with a computer of a different type is made impossible.
Removal of both W & LD computers being identical only one procedure is described.
R Only circuit breakers associated with computer to be removed are tripped.

2. Computer

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.47 m (14 ft.8 in.)	
Circuit Breaker Safety Clips	

B. Prepare

(1) For removal of computer No.1 (1C188) trip, safety and tag the following circuit breakers :

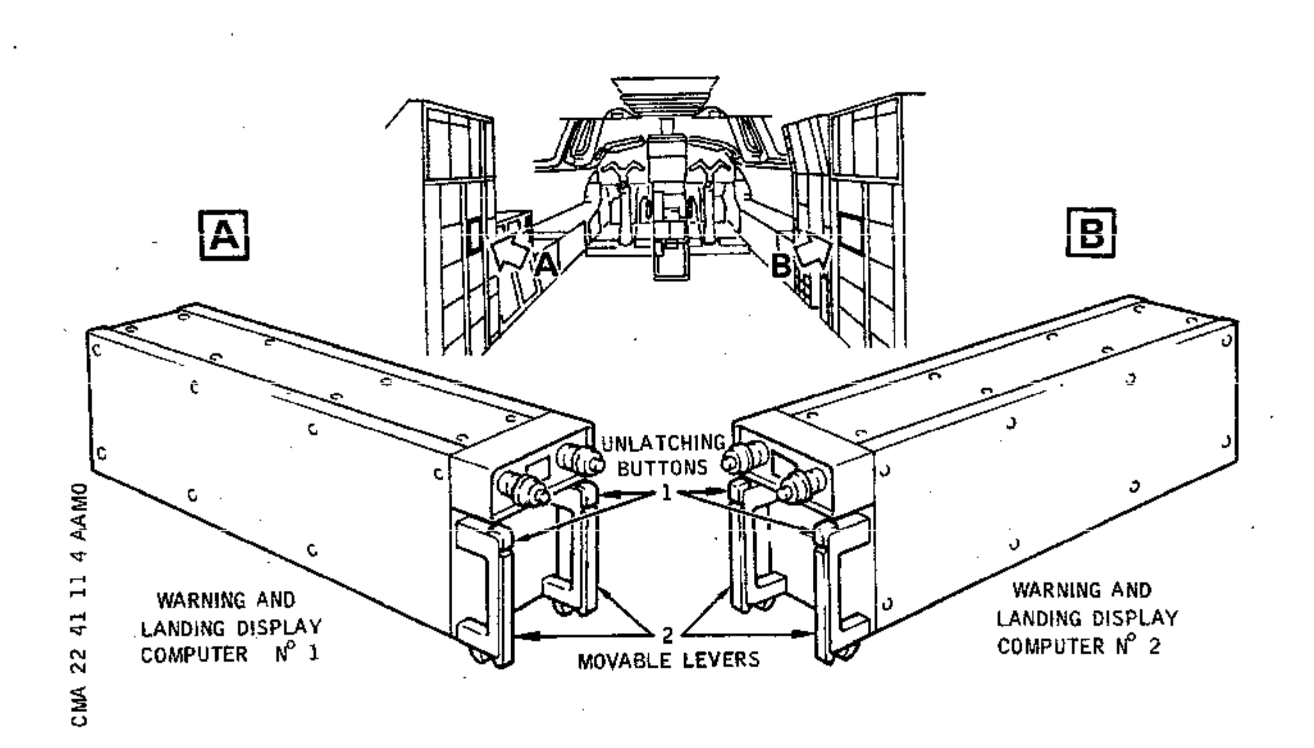
SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
WARN & LDG DISPLAY 1 SUP 1	1-213	1C 192	P13
WARN & LDG DISPLAY 1 SUP 2		1C 193	P14
LDG DISPLAY SYS 1 SUP	2-213	1C 191	F 4

(2) For removal of computer No.2 (2C 188), trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
WARN & LDG DISPLAY 2 SUP 1	5-213	2C 192	B11
WARN & LDG DISPLAY 2 SUP 2		2C 193	B12
LDG DISPLAY SYS 2 SUP	13-216	2C 191	F16

R R R (3) Remove panel 215BS to gain access to shelf 4-215 for removal of computer No.1 (1C188) or panel 216BS for removal of computer No.2 (2C188).

C. Remove



Location of Warning and Landing Display Computers
Figure 401

R (1) On front face of computer, press unlatching buttons (1) located on top of the two pulling handles.

(a) The two movable levers (2) fall.

R (2) Fully lower the two movable levers.

(3) Withdraw computer by pulling the handles.

D. Preparation of Replacement Component

R
R (1) Check that computer seating is clean and that rack connectors are in correct condition (no corrosion).

R
R
R (2) Visually check W & LD computer for correct external condition (no dents) and check that connectors are undamaged and free from traces of corrosion.

E. Install

(1) Press the two unlatching buttons.

(a) The two movable levers fall.

(2) Position computer on its rails.

(3) Push computer fully home.

R
R (4) Lift the two movable levers until pawls lock into position.

(5) Remove safety clips and tags and reset the circuit breakers previously tripped.

F. Tests

R (1) Carry out W & LD Test (Ref. 22-41-00, Adjustment/Test, paragraph 2 E).

G. Close-Up

R (1) Install panel 215BS or 216BS.

R (2) Remove access platform.

WARNING AND LANDING DISPLAY INDICATOR - REMOVAL/INSTALLATION

1. General

R CAUTION : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

R Removal procedures for both warning and landing display
R (W & LD), indicators being identical, only one procedure is des-
R cribed. The two indicators, 1C1822 and 2C182, are located on the
R Captain's instrument panel (panel 2-211) and the First Officer's
R instrument panel (panel 2-212) respectively.

R 2. Indicator

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.470 m (14 ft. 8 in.)	
Circuit Breaker Safety Clips	
R Blanking Caps	

B. Prepare

(1) Trip, safety and tag the following circuit breakers

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
WARN & LDG DISPLAY 1 SUP1	1-213	1C 192	P13
WARN & LDG DISPLAY 1 SUP2		1C 193	P14
LDG DISPLAY SYS1 SUP	2-213	1C 191	F 4
WARN & LDG DISPLAY 2 SUP1	5-213	2C 192	B11
WARN & LDG DISPLAY 2 SUP2		2C 193	B12
LH DASH INST LTS SUP	13-215	L 372	A12
LDG DISPLAY SYS2 SUP	13-216	2C 191	F16
RH DASH LTS SUP		L 371	E 9
PLTS LT TEST SUP	15-215	L1001	E14

WARNING : THE ELECTRICAL WIRING OF THE W & LD INDICATORS INSTALLED IN THE CAPTAINS AND FIRST OFFICER'S INSTRUMENT PANELS IS OF INSUFFICIENT LENGTH FOR DISCONNECTION OF INDICATOR PLUG CONNECTORS. AFTER REMOVING THE RELEVANT GLARESHIELD PANEL THE INDICATOR SHALL BE DISCONNECTED AND WITHDRAWN FROM THE FRONT.

C. Remove

(Ref. Fig. 401)

(1) On Captain or First Officer instrument panel (4) release dzus fasteners (1) attaching glareshield (6) panel.

(2) Lift glareshield panel partially, then gain access under glareshield panel and disconnect electrical connectors (5) from indicator (2).

(3) Loosen and remove four mounting screws (4) from W & LD indicator (2).

(4) Withdrown and remove W & LD indicator.

(5) Cap connectors (7 and 8).

D. Preparation of Replacement Component

(1) Make certain that component interface is clean, and that the two plug connectors are in good condition (no trace of oxidation).

(2) Check that W & LD indicator is in good external condition, that there are no dents and that receptacle connectors are intact and show no traces of oxidation.

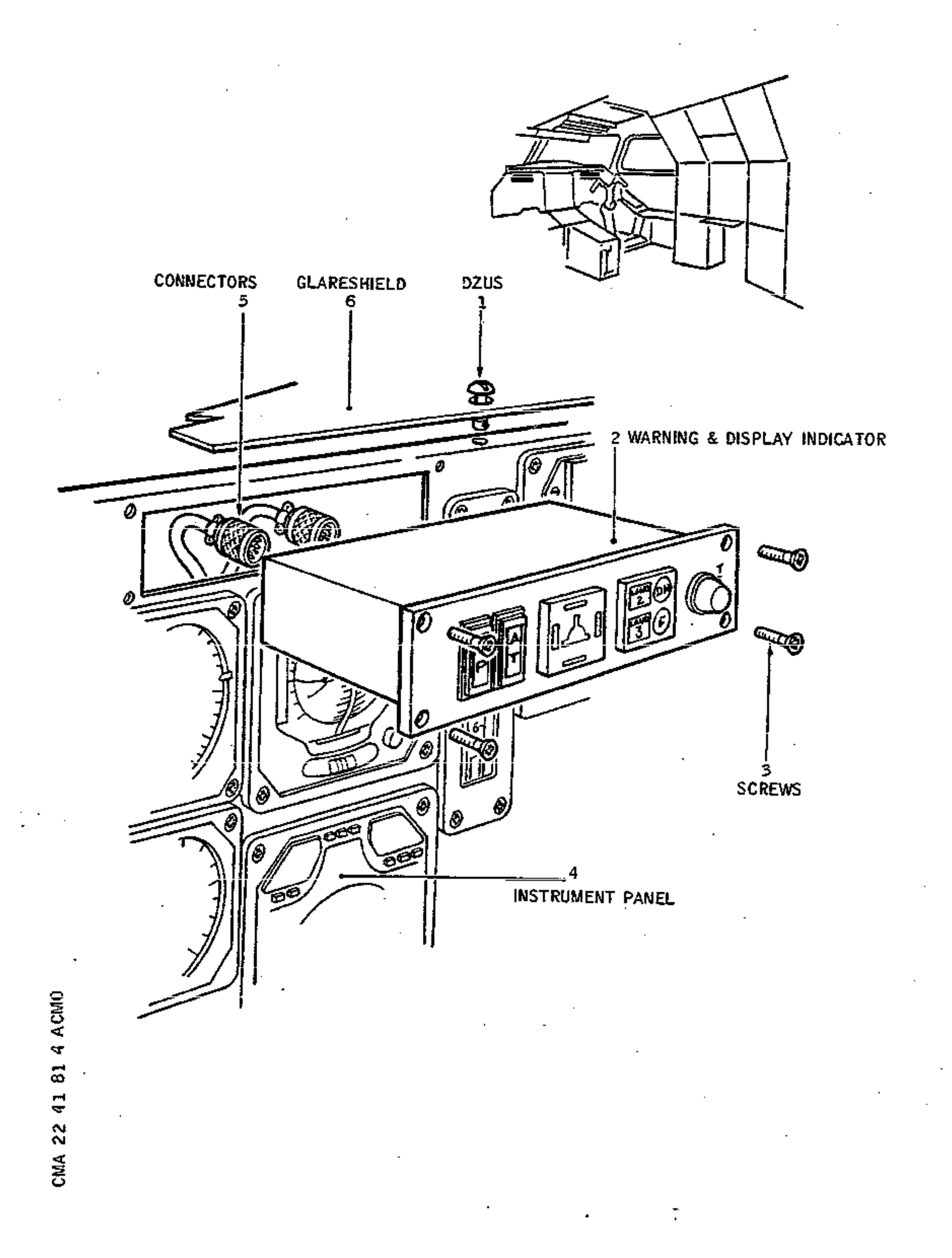
E. Install
(Ref. Fig. 401)

(1) Remove blanking caps from electrical connectors.

(2) Position W & LD indicator (2) in its seating and push it fully home against instrument panel (4).

(3) Install and tighten the four attachment screws (3).

(4) Lift glareshield panel (6) partially, then gain access under glareshield panel and connect electrical connectors (5) to W & LD indicator (2).



W & LD Indicator - Removal/Installation
Figure 401

(5) Lower glareshield panel (6) and attach with dzus fasteners (1).

F. Test

(1) Carry out a W & LD system test (Ref. 22-41-00, Adjustment/Test, paragraph 2.E.).

G. Close-Up

(1) Remove access platform.

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END OF THIS SECTION

NEXT

INTEGRATED TEST AND MAINTENANCE SYSTEM (ITEM) DESCRIPTION AND OPERATION

1. General

R The duplicate Integrated Test and Maintenance System (ITEM) is associated with the AFCS channels.
This built-in test equipment fulfills two functions : on the ground, TEST function; in flight, (monitoring) IFM function.
The results obtained from these two functions are complementary and enable any line replacement unit (LRU) needing to be replaced to be quickly and accurately identified.

A. Test Mode

Each AFCS computer includes test circuits which are designed to automatically check the operation of the internal safety devices and to ensure that integrity requirements are met. Moreover, this mode enables a large part of the analog computation channels to be checked for correct operation.

This internal test facility is controlled and interpreted by the ITEM which is actuated from the Flight Engineer's station.

The TEST function can only be used if the aircraft is on the ground, during a planned maintenance operation or in order to facilitate the location of a failed Line Replaceable Unit (LRU) after filing of a squawk sheet.

B. IFM Mode

This function provides in-flight monitoring of the logic conditions which enable the AFCS systems as well as the associated peripherals to be engaged.
It indicates the LRU which resulted in AFCS system disconnection during flight. It also indicates the faulty interlock which prevents a correct engagement of a particular facility from being obtained (for example : a mode) of the AFCS after selection. Moreover, it provides monitoring of the systems when they are disengaged for major failures originating from the internal supplies of each LRU (computer).

All failure indications are stored in a permanent memory. If necessary, a particular indication can be cancelled in flight. The ITEM system provides rapid appraisal of AFCS interlock faults (particularly those of a transient nature) as well as information for more accurate reporting of in

flight defects; it also enables the ground repair team to recall the failed interlocks.

C. Auto Test

On selection of either operating mode, the ITEM system automatically tests itself.

2. Description (Ref. Fig. 001)

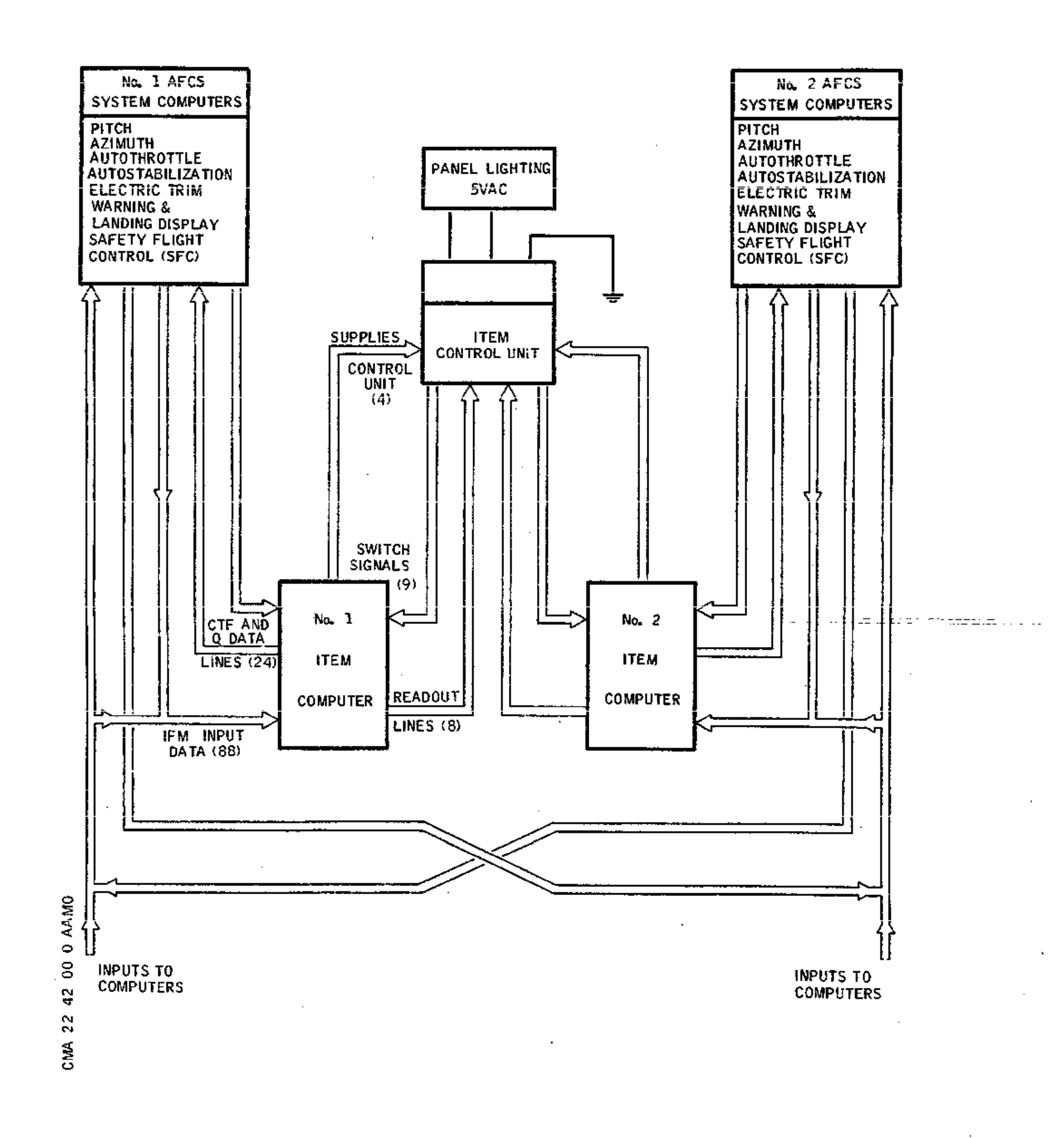
The Integrated Test and Maintenance System consists of :

R - Two computers (1C381) and (2C381) located on 4-215 LH shelf and 4-216 RH shelf respectively, in the electronics rack.
R - A common control unit (C382) interfaced with both computers. This unit is located on the right lower part of the Flight Engineer's station.

The signals from the various control unit switches are applied to the associated computer and from any selected computer, the control unit receives the signals to the indicators as well as the various supplies necessary for its operation.

The central test facilities (CTF) lines form a main bidirectional highway which interconnects the ITEM computer and the AFCS computers. These lines are used in TEST mode.

R The interlock signals from the AFCS (channel No.1 and channel No.2) computers are fed to the ITEM computer for use in IFM mode. However, most of the interlock signals used originate from the priority system control channel.



Item System
Figure 001

3. Computer

A. Description

R Each computer is housed in a casing.

The front face includes a connector for computer testing and maintenance, an hour meter and two handling grips.

The rear face includes three connectors, two of them for connection to the systems circuits for automatic flight and one for connection to the control unit.

B. Operation

The ITEM computer is a non-arithmetic digital computer. It only processes data.
It includes a processor associated with a clock controlled by a 5Mhz crystal. The oscillator output gives a time cycle of 6 microseconds. Three interleaved clock pulses are generated to control a three-step instruction cycle.

These pulses are sent to an instruction decoder to a memory and an address register module with control register and comparator.

Eight instructions control the computer operation.
These instructions are :

- Compare (three)
- Set control
- Enter Q
- Wait
- Display
- Jump

A PROM (programmable read only memory) memory comprises three modules. The program can be modified by replacing one of the modules. Each of these modules memorizes : 1024 words of 16 bits.

For each mode, the ITEM computer is interfaced.
In TEST mode, two interface modules enable, after connection of the input and output addresses (Q address and P address) to send questions transmitted through the five (Q 1 to Q5) Q lines and to receive the P (P1 to P7) data on the second interface. These answers, after multiplexing, are fed into the processor comparator.
In IFM mode, three interface modules provide signal answers to the programmed questions. These signals, after binary encoding into words are fed into the processor comparator.

The display module, controlled by the instruction "display" constitutes an interface between the computer and the indicator and control unit. It is provided with two address registers, one for the scratch pad memory the other for the relay bank module (this module and the display module are separate).

The scratch pad memory is used in TEST mode to memorize the test results before they are displayed.

The relay bank is the ITEM permanent memory. Its function is to memorize in order to keep intact the recording of the failures which occured during the flight. These recordings are and remain available even after aircraft power supply shut down.

System safety is ensured for both operation modes by safety relays or by relays for the TEST mode. These are multi-contact relays which ground the Central Test facility (CTF) Lines Q and P address, CTF ± 12V and the five Q lines. They ensure that no stimulus can be sent in the AFCS systems circuits during flight.

R The various voltages necessary to operate the computation circuits originate in the power supply module which receives the aircraft 115VAC supply.
This module consists of a conventional transformer rectifier It is followed by two stages of regulation.
The first stage is a switching regulator which doubles the input variation in order to avoid power loss through dissipation.
The second stage is a conventional linear regulator which maintains the output voltage constant with output loads and the residual variation in the input from the switching stage.
The continuous voltages are as follows :
+ 12VDC, - 12VDC, + 5VDC and + 6VDC.
The last mentioned voltage is used for the control unit lamps supply ; this supply is limited (300 mA).

4. Control Unit (Ref. Fig. 002)

A. Description

The control unit panel is divided into four quadrants.
R The two LH quadrants indicate the condition of side 1
R channels, the two RH quadrants the condition of side 2
R channels.

The two upper sections concern the in-flight monitoring
R mode (IFM) and the two lower sections the on the ground
R test mode (TEST).

The following controls and indications are available :

R (1) Two IFM/OFF/TEST mode selector switches

R (2) One FLIGHT/TEST ALL/TEST UNIT function selector switch common to both sides.

R (3) Two SELECT/START switches used in TEST mode
R (These switches return to centre position).

R (4) Two READ/CANCEL switches used in IFM mode (these
R switches return to centre position).

(5) Two TEST IFM INDICATOR push-buttons for IFM indication test.

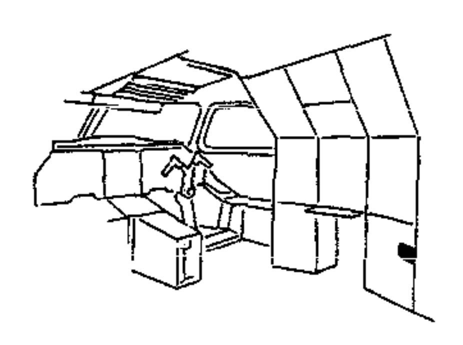
(6) Eight windows (indicators) used to display failures or systems which are being tested.

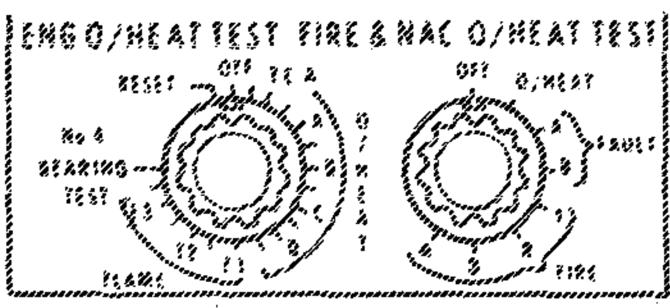
R (a) Side 1 (windows 1 and 2) IFM mode.

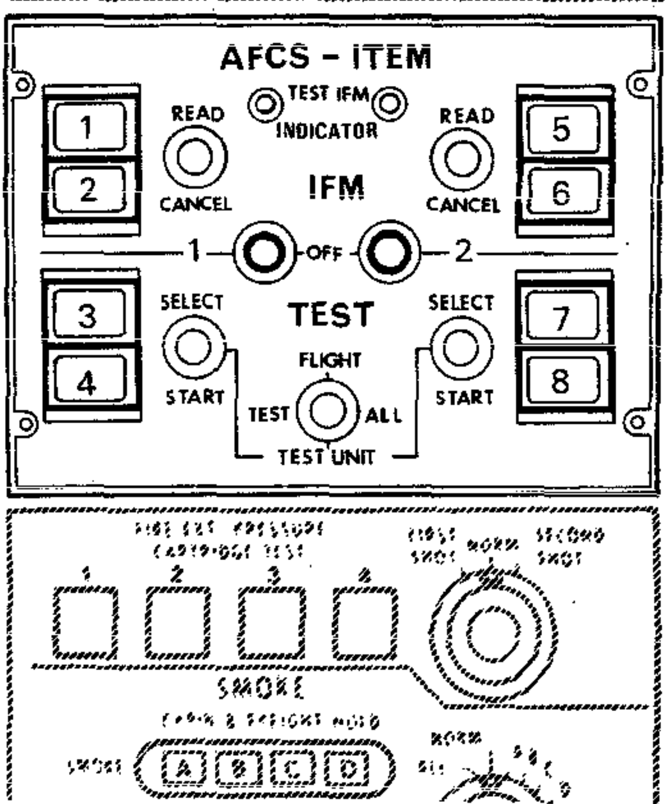
R (b) Side 1 (windows 3 and 4) TEST mode.

R (c) Side 2 (windows 5 and 6) IFM mode.

R (d) Side 2 (windows 7 and 8) TEST mode.







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ITEM Control/Indicator Panel
Figure 002

R

R B. Operation in TEST Mode

R It includes two functions :

- Automatic check of all the AFCS computers as well as
R of the ITEM system (TEST ALL function).

R Check of one AFCS computer as well as of the ITEM system
R (TEST UNIT function).

R (1) Automatic check of all the AFCS computers as well as of the ITEM system.

R (a) Initial conditions required

R The ADC switch associated with the chosen side is
R placed in ON position, and the relevant TEST
R selector switch in position 2. Reset.

R - The PITCH, ROLL and YAW levers of the AUTOSTAB
R channel to be tested are engaged.
R - The AUTOTHROTTLE isolation switches are in ON
R position.
R - The throttle control levers are placed in max.
R thrust position so that GO AROUND mode circuits
R can be tested.

R <u>NOTE</u> : Placing ADC TEST selector switch in
R position 2 results in the decrease of the
R comparison threshold when IAS is greater
R than 270 kts. This is required to test the
R autostabilizer yaw or pitch axis. In the
R latter case, both autostabilizer pitch
R channels can be engaged so that SFC
R superstabilization function is not taken
R into account.
R When the first step of test is completed,
R the three engaged levers return to OFF
R position.

R (b) Accomplishment of test

R - The aircraft is on the ground (nose gear shock
R absorber compressed).
R - The relevant IFM-OFF-TEST selector switch is
R placed in TEST position.
R - The FLIGHT-TEST ALL-TEST UNIT selector switch
R is placed in TEST ALL position.

R <u>NOTE</u> : The AP/FD pitch computer transmits the
R (-15 V, ground ; + 15 V, flight) signals

indicating that the nose gear shock absorber compressed microswitches are closed ; if the computer is not installed in its rack or if it is not power supplied the associated ITEM channel TEST function is ineffective.

The following sequence becomes automatic.

- Autotest and initialization.

On selection of TEST mode, and TEST ALL function, the ITEM system is autotested and provides a ± 12 volts power supply to the AFCS channels to be tested.
This sequence duration is 2 minutes 30 seconds approximately.

During the first part of the sequence, or 1 minute approximately, ITEM and TEST indications must appear respectively in windows 3 and 4, or 7 and 8, according to the side chosen.
A slight flicker of the indications is normal.
If the autotest is ineffective, FAIL indication appears in lieu of TEST indication, and TEST mode cannot be used.

During the second part of the sequence, the self-test circuits for the computers and the detectors (rate gyros, accelerometers) are initialized (zero setting of comparators). If initialization is not correct, ITEM and FAIL indications are displayed and prevent the use of TEST mode.

NOTE : As a rule, FAIL indication proves a defective operation of the ITEM system.

- The ALL and TEST indications remain during 12 minutes 30 seconds approximately, after which these indications become ALL and PASS if the sequence is correct.

The sequence is as follows :

SEQUENCE	MEANING
SFC	Safety Flight Control computer
AP-P	AP/FD pitch computer
AP-A	AP/FD azimuth computer
AT	Autothrottle computer
AS-P	Autostabilizer - pitch axis

SEQUENCE	MEANING
AS-R	Autostabilizer - roll axis
AS-Y	Autostabilizer - Yaw axis
ET	Electric Trim computer
WLD	Warning and Landing Display computer

At the end of the sequence, the indications ALL and PASS are cancelled by setting the IFM/OFF/TEST selector switch to OFF position.
If the sequence is not correct, the indications of the system considered as well as the legend to indicate the faulty part will replace ALL and PASS indications respectively (for instance AT and ACCL). The legends which can appear are as follows :

LEGEND	DISPLAYED WITH	INTERPRETATION
COMP	Any computer	Computation channel, comparator or supply failure
LAND	AP.P (AP/FD Pitch computer) AP.A (AP/FD Azimuth computer)	Automatic approach computation channel failure
R GYRO	R AS.P (Autostabilizer - pitch axis) R AS.R (Autostabilizer - roll axis) R AS.Y (Autostabilizer - yaw axis)	Failure of corresponding axis rate gyro (control rate gyro for pitch axis).
R GYR.M	AS.P (Autostabilizer - pitch axis)	Failure of monitoring rate gyro for pitch axis.
R ACCL	AS.Y (Autostabilizer - yaw axis)	Failure of lateral accelerometer
ACCL	AT (Autothrottle)	Failure of longitudinal accelerometer

(2) Check of one computer and of the ITEM system.

R (a) Initial conditions required

(a1) Test of AP/FD azimuth computer

- AUTOTHROTTLE isolation switches in ON position.
- Throttle control levers in max. thrust position.

(a2) Test of pitch or yaw axis autostabilization computer

- The ADC switch associated with the chosen side is in ON position and the relevant TEST selector switch in position 2. Reset.
- The pitch or yaw axis to be tested is engaged.

(a3) Test of roll axis autostabilization computer

- The roll axis to be tested is engaged.

(b) Accomplishment of test

- The aircraft is on the ground (nose gear shock absorber compressed).
- The relevant IFM-OFF-TEST selector switch is placed in TEST position.
- The FLIGHT-TEST ALL-TEST UNIT selector switch is placed in TEST ALL position.

The sequence starts in the same way as for the automatic check of all the computers, that is by the ITEM system autotest : ITEM and TEST indications, followed with ITEM and PASS appear in the same way if the autotest is effective. If autotest is ineffective, FAIL indication replaces PASS indication.

The second part of the sequence is manually initiated :

- Place and hold SELECT/START switch in SELECT position until ITEM indication is replaced in window 3 or 7 by indication of the computer to be tested.

The indications relating to AFCS computers are displayed cyclically as follows : SFC, AP.P, AP.A, AT, AS.P, AS.R, AS.Y, ET, WLD. The legend changing every three seconds.

- Release switch when the indication of the

R chosen system appears.
R - Place switch in START position, then release
R it. The test is initiated.
R - If test is effective, the chosen system legend
R and PASS indication are displayed, for instance:
R PASS appears at the end of test (windows 3 and
R 4) or (window 7 and 8).
R - If test is ineffective, the chosen system legend
R appears with an indication of the failure as
R per table above. For instance, AS-Y indication
R may appear together with COMP, GYRO or ACCL.
R As for the automatic check, place IFM-OFF-TEST
R selector switch in OFF position to cancel the
R indication of the selected computer and the
R indication "PASS".

R C. Operation in IFM Mode

(1) Use before the flight.

This function is normally selected before the aircraft
R departure.

R - IFM-OFF-TEST selector switch(es) is (are) placed in
R IFM position.

R - FLIGHT-TEST ALL-TEST UNIT selector switch is placed
R in FLIGHT position.

- As for TEST mode, the ITEM starts in autotest mode
R and ITEM indication appears in windows 2 and 4 during
R one minute approximately. If the autotest is effec-
R tive ITEM indication disappears ; if the autotest
R is ineffective, the ITEM indication remains, indica-
ting the failure of the ITEM computer.
R This sequence checks the proper operation of the ITEM
computer IFM mode as well as a part of the connec-
tions between the ITEM computer and the AFCS
computers.

- After ITEM indication has disappeared, it is possible
to check if the indications displayed in IFM 1 and 2
R indicators are correct by pressing the TEST IFM
INDICATOR push-button of the side selected. The indi-
cations will appear cyclically at three second inter-
R vals as long as the push-button is depressed.
The legends displayed are as follows, depending on
the side selected.

	DISPLAY	FUNCTION	WINDOW
R	ITEM	Autotest	WINDOW 2 or 6
R	PWR	115 VAC & 28 VDC Power	WINDOW 2 or 6
R		Supplies	
R	AP.P	AP Pitch Computer	WINDOW 1 or 5
R	AP.A	AP Azimuth Computer	WINDOW 1 or 5
R	FD.P	FD Pitch Computer	WINDOW 1 or 5
R	FD.A	FD Azimuth Computer	WINDOW 1 or 5
R	AS.P	Autostabilizer - Pitch	WINDOW 1 or 5
R	AS.R	Autostabilizer - Roll	WINDOW 1 or 5
R	AS.Y	Autostabilizer - Yaw	WINDOW 1 or 5
R	ET	Electric Trim	WINDOW 1 or 5
R	AT	Autothrottle	WINDOW 1 or 5
R	INS	Inertial Navigation System	WINDOW 1 or 5
R		& ISCU	
R	SFC	Safety Flight Control	WINDOW 1 or 5

	DISPLAY	FUNCTION	WINDOW
R		Computer	
R	WLD	Warning and Landing Display	WINDOW 2 or 6
R	ADS	Air Data System	WINDOW 2 or 6
R	INST	VSI or Altimeter	WINDOW 2 or 6
R	C.CP	Compass Coupler	WINDOW 2 or 6
R	HSI	Horizontal Situation Instrument	WINDOW 2 or 6
R	R-ALT	Radio Altimeter	WINDOW 2 or 6
R	ILS	LOC or GLIDE Receivers	WINDOW 2 or 6

R IFM indicator test can be carried out with an IFM
R indication displayed.
R This indication will re-appear on completion of test.

If an indication does not appear during three seconds, the corresponding indicator is not operating properly. It is then necessary to ensure this indicator light does not correspond to a failure which occured in the previous flight and was not cancelled.

R <u>NOTE</u> : ITEM mode is ineffective when the aircraft is on
R the ground (nose landing gear compressed), so
R that the various disengagements which ocurred
R during checks before flight are not recorded.

(2) In flight operation

The selector switches remain in the same position, that is in FLIGHT and IFM position.
If a logic condition of any system disappears, the associated warning is generated and the indication of the disconnected system appears on either IFM mode indicator. This indication is memorized in the relay bank (permanent memory).

R If disengagement is intentional :

R - operation of instinctive disconnect switch
R - operation of engage switch

R the ITEM system does not memorize or display the
R indication.
R This also occurs if disengagement results from
R selection of incompatible modes.

R (a) Specific cases

The origin of some disengagements resulting from signals or action which are not monitored in IFM mode is not indicated by the ITEM system.

(a1) If the SFC system is engaged and some fault in the SFC system results in the disengagement of the associated roll and pitch autostabilizer channels, the ITEM system displays AS-P and AS-R in lieu of SFC.

(a2) Autopilot system disengagement

- through AP force limiters
- resulting from failure in hydraulic systems

is displayed on the ITEM control and indicator panel as an autopilot system failure (AP-P).

(a3) Autothrottle system disengagement through pilot override is displayed on the ITEM control and indicator panel as an autothrottle system failure, AT.

(a4) Electric trim disengagement through pilot override is displayed on the ITEM control and indicator panel as an electric trim system failure ET.

As PWR indication display can lead to the loss of one or several systems it will be memorized only if the loss of supply concerns the ITEM system itself.

Moreover, if for any reason it is wished not to memorize a disconnection, place READ/CANCEL switch in CANCEL position. The indications as well as the memorization are cancelled. The ITEM program is inhibited as long as this switch is held in CANCEL position.

(3) After flight operation

The selector switches remain in the same position, that is FLIGHT and IFM.

In order to be able to read back the disconnections which occurred during the flight (the last failure indication can still be read in either IFM indicator) :
- Place READ/CANCEL switch in READ position. The indications are displayed in either IFM indicator at three second intervals. As long as the switch is held in READ position, all the failure indications are dis-

played.

When the component which caused the disconnection is replaced or repaired, corresponding indication can be
R erased from the memory in the following manner :

R - Place READ-CANCEL switch in READ position to display
R the failure indication.
R - Place READ-CANCEL switch in CANCEL position to erase
R the system failure from the "relay banks" memory and
R the indication system.

5. Operation (Ref. Fig. 003, 004 and 005)
(Ref. Fig.006 and 007)

A. Test Mode Principle

Information is exchanged between the ITEM computer and the AFCS computers by means of an organised busbar system.

In the AFCS computers, the self test circuits cannot receive orders until ITEM energizes the ± 12 Volt Central Test Facility (CTF) voltages. An address line enables each computer to communicate with the input and output busbars.
One of the nine input address lines, Q Address (QA), runs to each computer. (The autostabilizer is considered in the same way as if there were three computers). The ITEM activates only one of these lines at a time, which enables the selected computer to receive five logic orders from Q1 to Q5 in parallel via the five Q data lines. These orders are decoded into analog signals which are sent to the computation circuits on the monitoring and control channels.

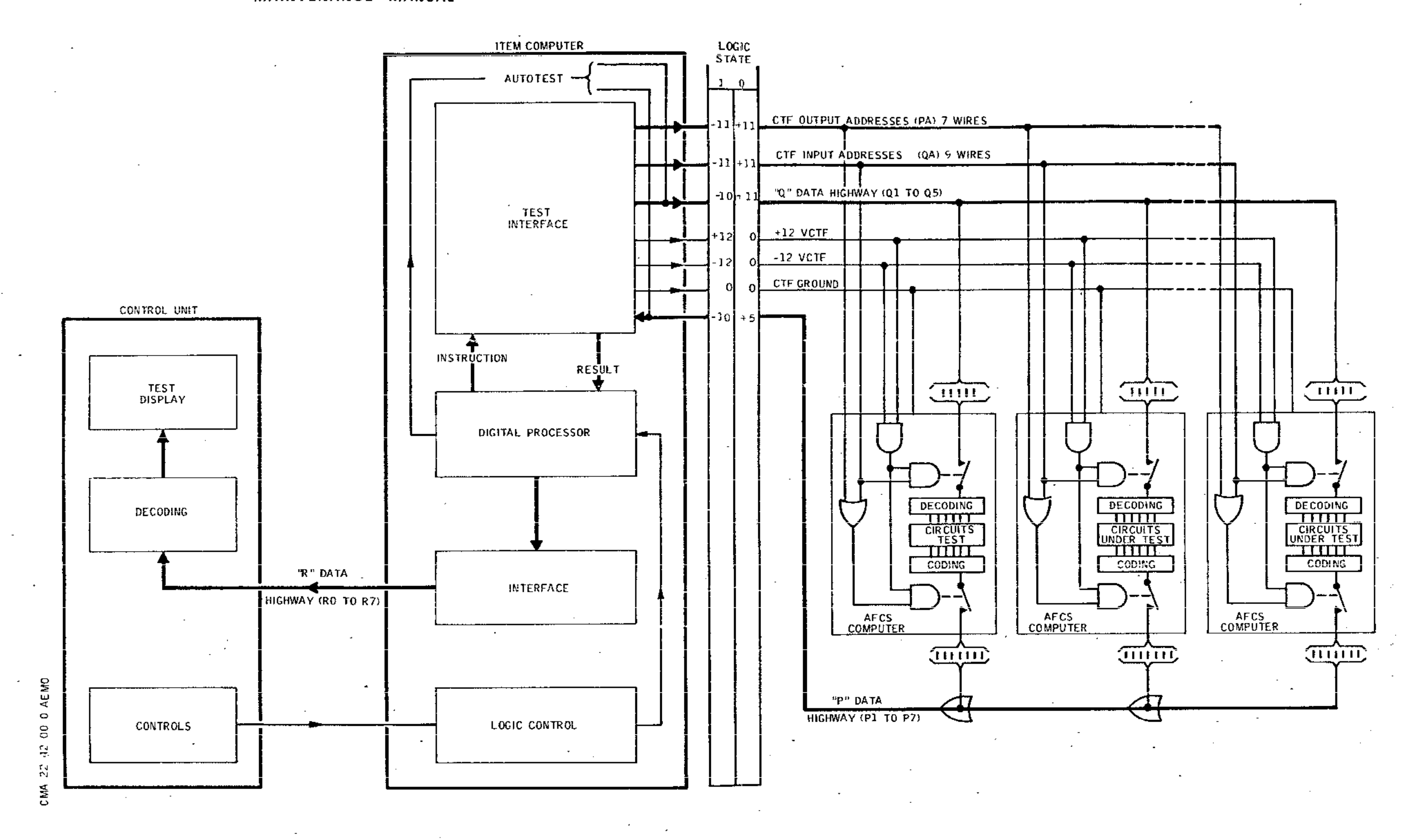
One of the seven P. address output lines (PA) enables the ITEM to connect the selected computer to the busbars output only without taking into account the logic orders transmitted from the five Q-data lines. It is to be noted that the ITEM can only simultaneously activate the PA output address line of the computer to which the active QA input address line is connected.

The computation circuits of the selected computer being tested, the ITEM varies the Q data logic orders, which leads to the production of a certain number of stimuli. After going through the comparators and the level switches, these stimuli are fed into an encoding circuit which transforms the feedback analog signals into digit signals. This output encoding circuit has coded programs which indicate the computer is healthy.
The coded results of this comparison are sent through the seven P1 to P7 P data lines to the ITEM computer. A cabled OR gate on these lines enables a common output for two output conditions in order to maintain an "O" condition when the computer is not selected any more.
After going through the ITEM computer for comparison with the programmed data, the results are sent to control unit indicator panel via eight R (read out lines) lines.

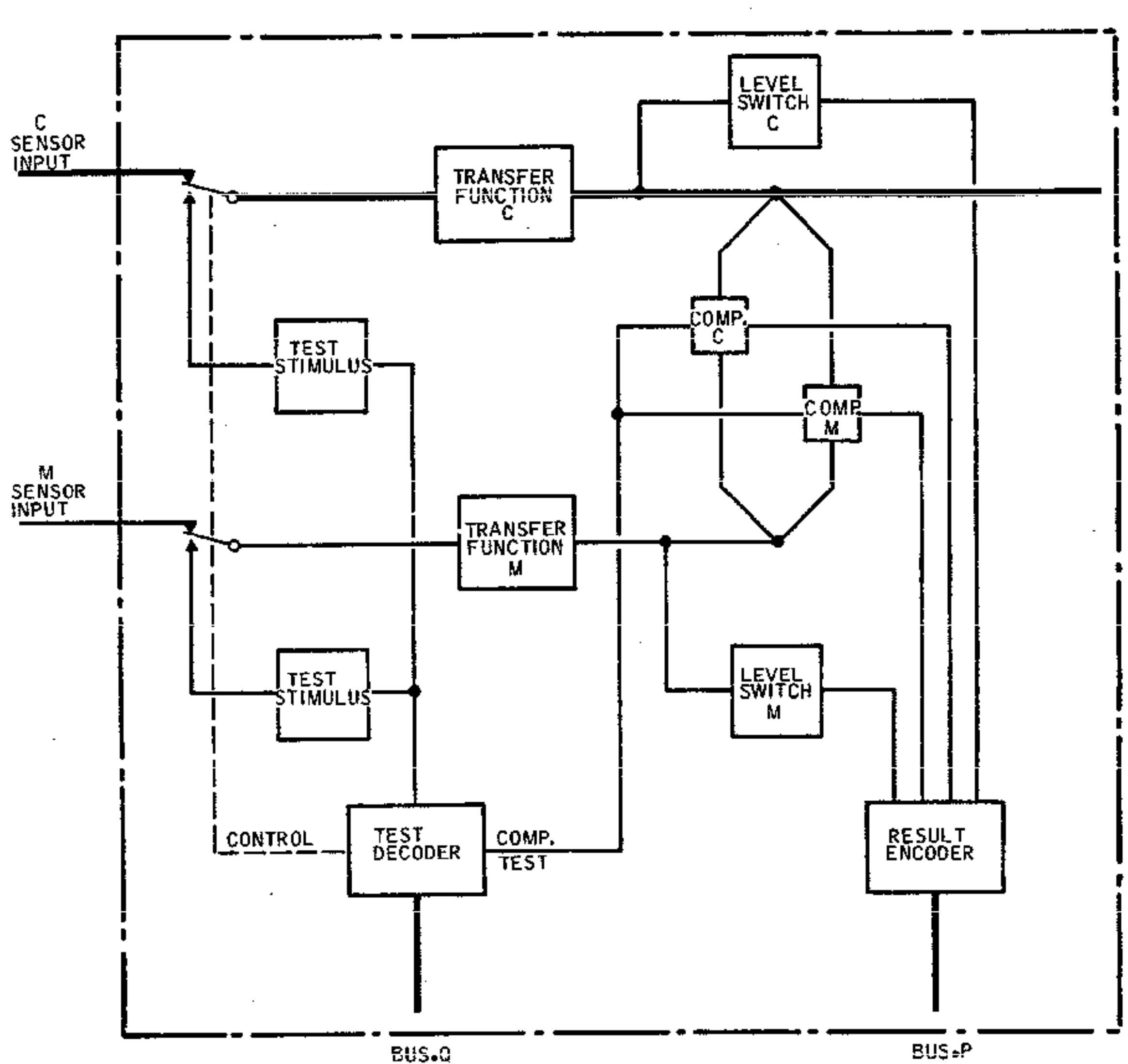
B. IFM Mode Principle

When IFM mode is active, the ITEM continually scans the status of the AFCS systems engage switches. This scanning continues until a disengagement is detected.

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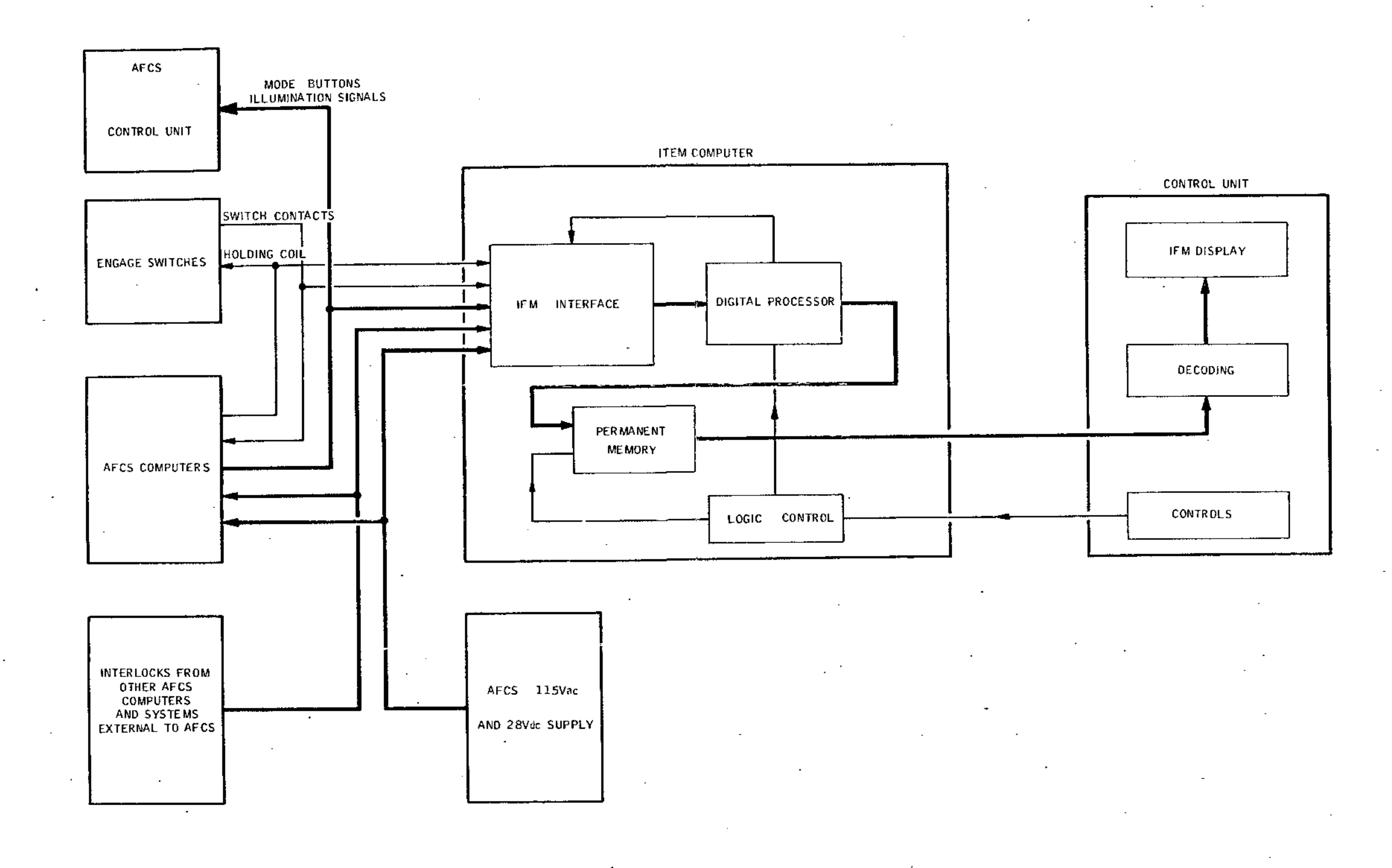


TEST Mode Principle
Figure 003

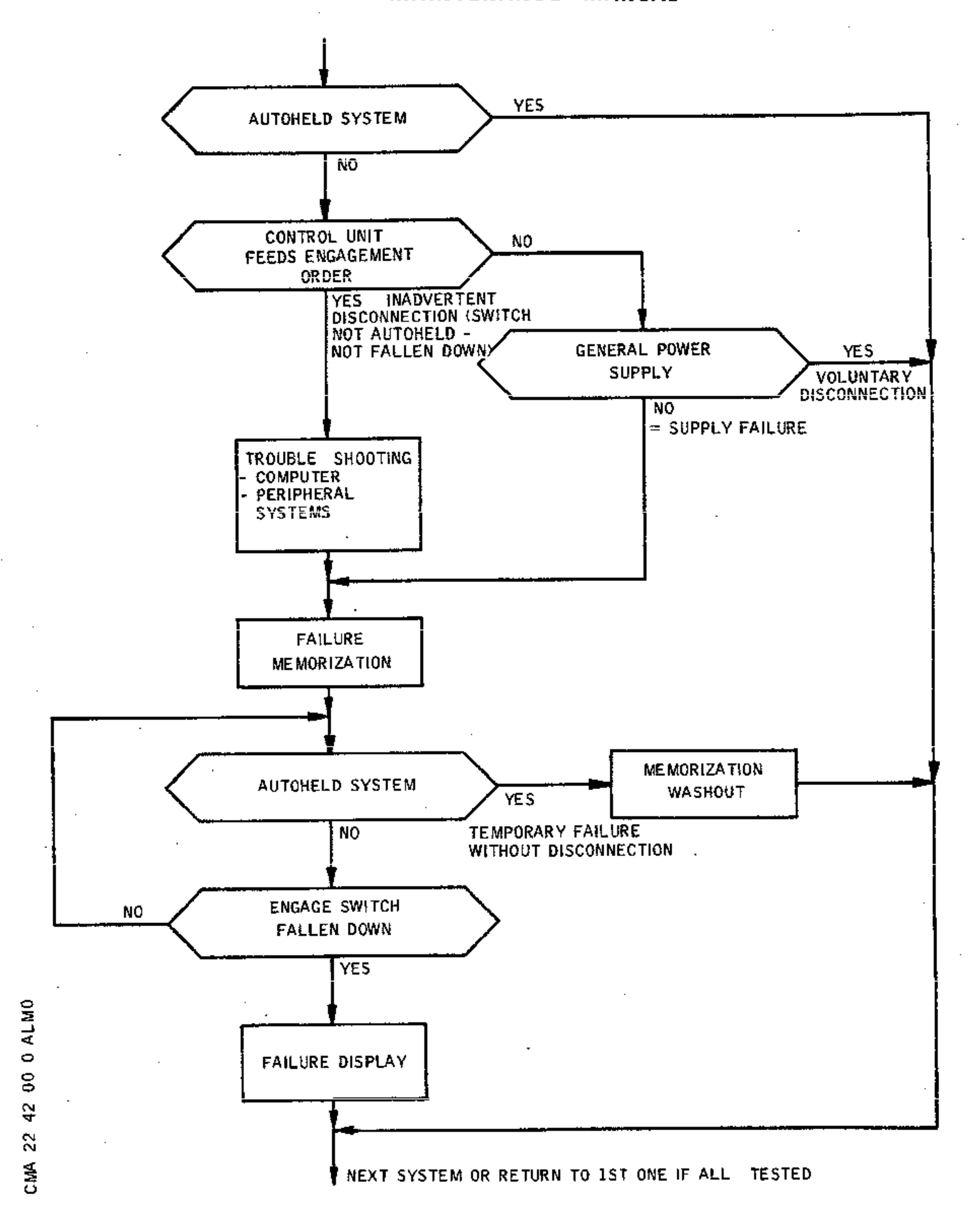


Principle of Computer Test
Figure 004

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IFM Mode Principle
Figure 005



IFM Mode Function Block Diagram
Figure 006

The ITEM receives derived signals from each system engage switch contacts as well as from the corresponding holding coil, from the mode indicator lights, the aircraft power supplies and the interlock inputs of the scanned system computer.

During its main scanning of the engage switches, the ITEM checks every system found disengaged as a result of a major failure which may be due to its internal supply or to the loss of the aircraft supply at the associated circuit breaker. Temporarily, it also memorizes the engage status of the systems. This is done in the scratch pad memory.
When there is a mode switch over, the ITEM confirms the new mode with one cycle delay as this change does not become operative until the contacts are actually open.
If there is no failure, a cycle lasts five milliseconds approximately.
If there is failure, the delay necessary to search the failure, memorize, and display it, does not reach ten milli-seconds.

C. Warnings and Safety Features

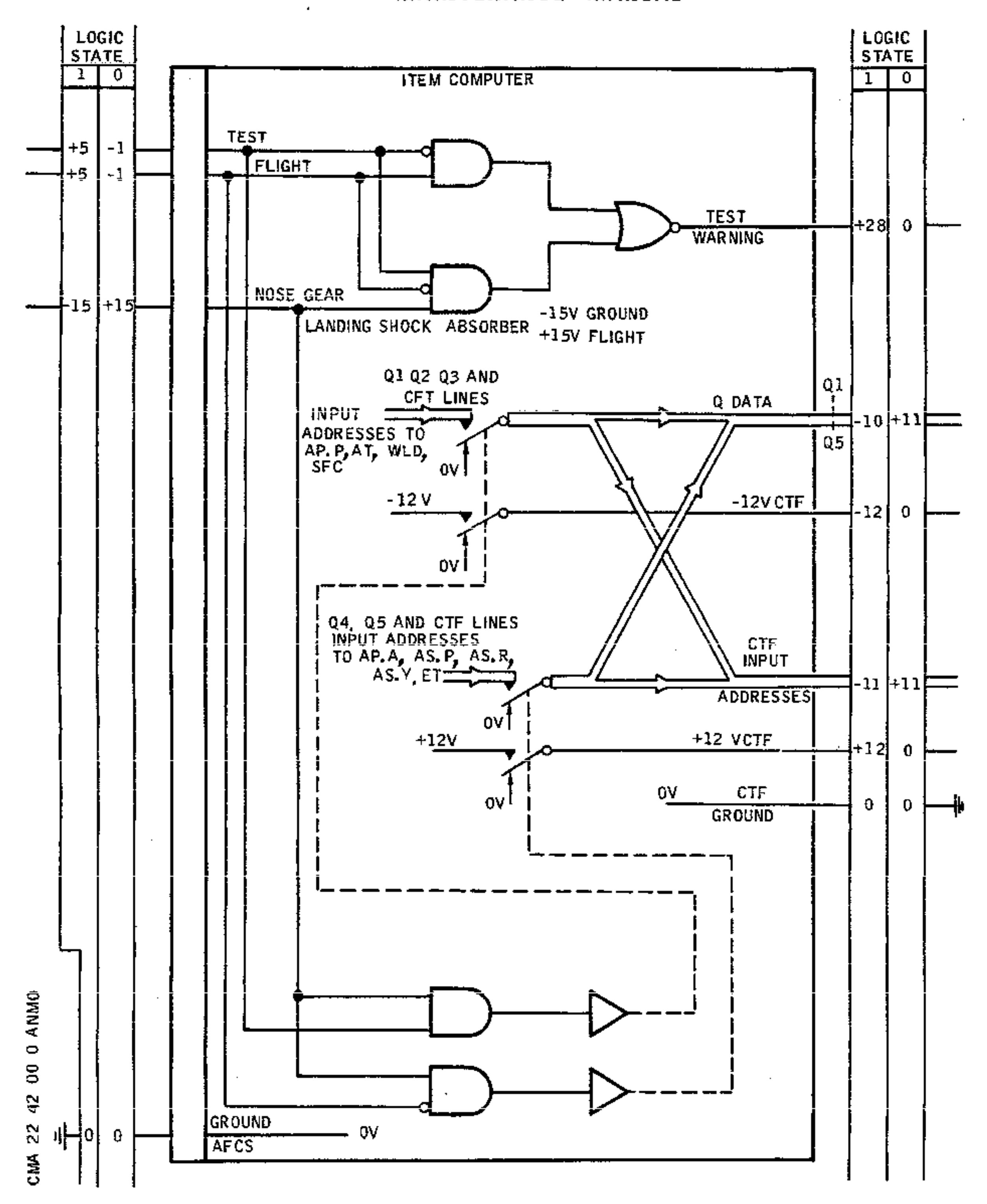
(1) Test warning

Precautions are taken to avoid the possibility of the TEST mode program being initiated in flight. To this effect, a warning is generated from the selectors positions as well as from the nose gear weight microswit-
R ches (G320), associated with realy (G297), and (G321),
R associated with relay (G299), when non compatible positions are set.
The warning will be displayed on the control unit front face on the IFM mode "indicator 2" and on the TEST mode "indicator 4". These indicators will illuminate in red. This warning overrides any other indication and is fed through the R lines as a unique code.

The cases of incompatibilities are as follows :

AIRCRAFT	IFM/OFF/TEST SELECTOR SWITCH	FLIGHT/TEST ALL/ TEST UNIT SELECTOR SWITCH
IN FLIGHT	TEST	EITHER
ON GROUND	TEST	FLIGHT
EITHER	IFM	TEST UNIT
EITHER	IFM	TEST ALL

(2) Control unit selector switches



Test Line Switching and Test Warning
Figure 007

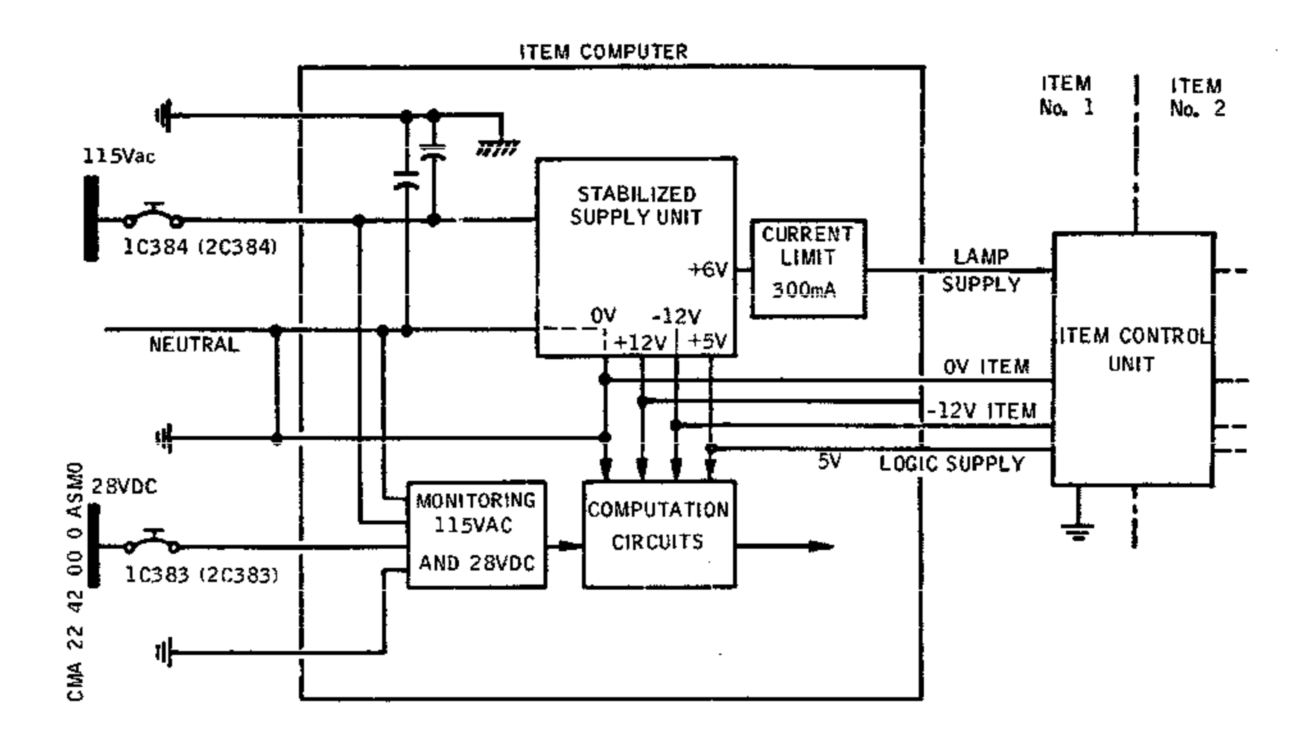
For each channel two selector switches can be operated before the ITEM begins the test sequence. Both main selector switches IFM/OFF/TEST lock in all three positions in order to prevent untimely engagement.

(3) Test mode switching

As further safeguard, the CTF input address lines, the five Q data lines and the ± 12 Volt CTF lines are grounded in the ITEM computer during flight. These lines are dwided into two groups which are disconnected separately from the ground when the aircraft is on the ground (shock absorber compressed) by the two mode selector switches. The separation was chosen with regard to the internal test logic of the AFCS computers so that no computer can respond to any Q test lines unless both groups of lines are disconnected from earth

The first group includes three (Q1 to Q3) Q data lines and the input address lines of the computers AP.P, AT, WLD, SFC.
The second group includes two Q data (Q4 and Q5) lines and the input address lines of AP.A, AS.P, AS.R, AS.Y, and ET computers.

6. Power Supply (Ref. Fig. 008)



Power Supply and Earthing Connections
Figure 008

The ITEM system is powered through from 10X and 11X avionics busbars for 115VAC and from 3P and 4P essential busbars for 28VDC.

28VDC supply is used only for the system monitoring computation circuit.

The 115VAC neutral is connected to AFCS ground; this connection is external to the ITEM computers; it must remain external in order to avoid damage.

FUNCTION	BUSBAR	PANEL
AFCS TEST (1) 115V SUP	"A" AVIONICS BUSBAR 10X	13-215
AFCS TEST (1) 28V SUP	"A" ESSENTIAL BUSBAR 3P	1-213
AFCS TEST (2) 115V SUP	"B" AVIONICS BUSBAR 11X	13-216

FUNCTION	BUSBAR	PANEL
AFCS TEST (2) 28V SUP	"B" ESSENTIAL BUSBAR 4P	5-213

INTEGRATED TEST AND MAINTENANCE SYSTEM (ITEM)
TROUBLE SHOOTING

WARNING : OBSERVE THE ELECTRICAL SAFETY PRECAUTIONS DESCRIBED IN 24-00-00, SERVICING.

1. General

The following information is intended to enable faults found in flight or on the ground to be quickly rectified.

The ITEM system consists of two identical channels.

A fault can be isolated with the aid of trouble shooting procedures (Refer to paragraph 3) through OK and NOT OK paths. If a defect occurs, perform the appropriate corrective action or refer to the chart indicated ; then, repeat the operations at which the defect was encountered to ensure that the operation is OK.

Bracketed numbers in the preparation procedure and charts indicate items on the component identification table (Ref. Table 101). Component location is also indicated in this table.

All procedures dealing with trouble shooting are based in the assumption that electrical wiring is serviceable and electrical power available.

If the fault is not rectified after the corrective action, check wiring in accordance with the wiring Diagram Manual (Refer to Table 101).

2. Prepare

NOTE : During the trouble shooting procedures, the aircraft must be on the ground, shock absorbers compressed.

**ON A/C 001-001,

A. Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
NOSE UC WEIGHT SW "A" SYS SUP	1-213	G 291	M16
LH UC WEIGHT SW "A" SYS SUP		G 292	M17
RH UC WEIGHT SW & DOWNLOCK "A" SYS SUP		G 295	M18

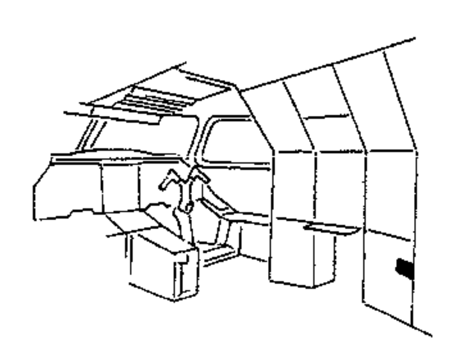
SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
ADC 28 V SUP		1F 74	P12
WARN & LDG DISPLAY SUP 1		1C 192	P13
WARN & LDG DISPLAY SUP 2		1C 193	P14
TRIM 1 CONT		1C 161	Q11
AT CONT		1C 180	Q12
AP/FD SYS 1 CONT		1C 17	Q13
AFCS 1 CONT		1C 19	Q14
FD1/FD2 1st PLT SW SUP		1C 27	Q15
AFCS TEST 1 28 V SUP		1C 383	R12
ADC 1 26 V SUP	2-213	1F 78	A 2
LAT ACCLMTR 1 26 V SUP		1C 42	B 4
AUTOSTAB 1 COMP SUP		1C 37	E 5
ADC 1 115 V SUP		1F 73	F 3
LDG DISPLAY SYS 1 SUP		1C 191	F 4
LH UC WEIGHT SW & DOWNLOCK "B" SYS SUP	3-213	G 293	B 8
RH UC WEIGHT SW "B" SYS SUP		G 294	B 9
NOSE U/C W/SW "B" SUP		G 296	D 8
AP/FD SYS 2 CONT	5-213	2C 17	A11
AFCS 2 CONT		2C 19	A12
FD1/FD2 2nd PLT SW SUP		2C 27	A13
AT CONT		2C 180	A14
WARN & LDG DISPLAY 2 SUP 1		2C 192	B11
WARN & LDG DISPLAY 2 SUP 2		2C 193	B12
TRIM 2 CONT		2C 161	B13
SAFETY FLT CONT No.2 SUP		2C 651	D17
AFCS TEST 2 28 V SUP		2C 383	F11
ADC2 28 V SUP		2F 74	F12
AP/FD COMP 1 SUP	13-215	1C 18	A 5
AFCS MODE SYS 1 SUP		1C 273	B 5
TRIM COMP 1 SUP		1C 162	C 5
AT SYS 1 SUP		1C 179	C 6
AT SYNCHRO SYS 1 SUP		1C 181	D 5
AFCS TEST 1 115 V SUP		1C 384	D 6
TRIM SYNCHRO SYS 1 SUP		1C 163	E 5
SAFETY FLT CONT COMP No.1 115 V SUP		1C 652	E 6
SAFETY FLT CONT COMP No.1 26 V SUP		1C 653	F 6
AP/FD SYS 1 SUP		1C 20	F15
ADC 2 26 V SUP	13-216	2F 78	A15

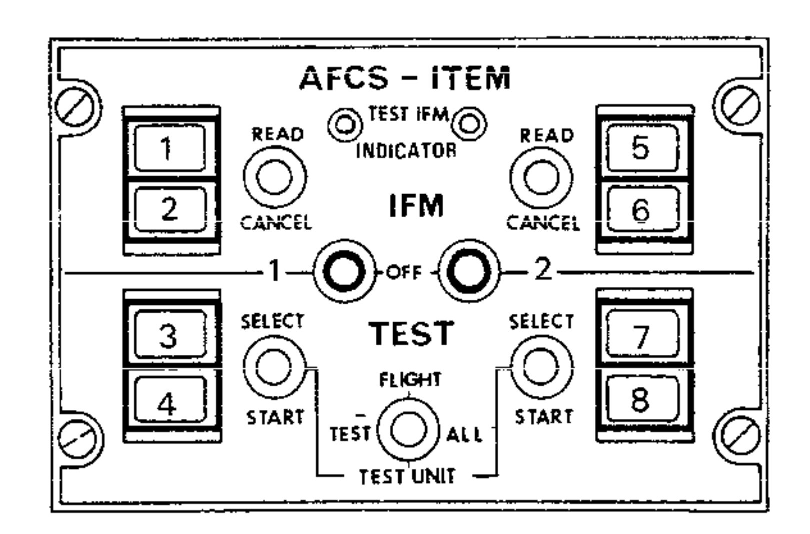
SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
TRIM SYNCHRO SYS 2 SUP		2C 163	A16
AP/FD SYS 2 SUP		2C 20	A17
LAT ACCELMTR 2 26 V SUP		2C 42	B16
AT SYNCHRO SYS 2 SUP		2C 181	B17
SAFETY FLT CONT COMP No.2 26 V SUP		2C 653	C16
SAFETY FLT CONT COMP No.2 115 V SUP		2C 652	C17
AT SYS 2 SUP		2C 179	D16
AUTOSTAB 2 COMP SUP		2C 37	D17
TRIM COMP 2 SUP		2C 162	E16
AFCS MODE SYS 2 SUP		2C 273	E17
ADC 2 115 V SUP		2F 73	F15
LDG DISPLAY SYS 2 SUP		2C 191	F16
AFCS TEST 2 115 V SUP		2C 384	F17
AP/FD COMP 2 SUP		2C 18	F18

R **ON A/C 002-007,
A. Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
NOSE UC WEIGHT SW "A" SYS SUP	1-213	G 291	M16
LH UC WEIGHT SW "A" SYS SUP		G 292	M17
RH UC WEIGHT SW & DOWNLOCK "A" SYS SUP		G 295	M18
ADC 28 V SUP		1F 74	P12
WARN & LDG DISPLAY SUP 1		1C 192	P13
WARN & LDG DISPLAY SUP 2		1C 193	P14
TRIM 1 CONT		1C 161	Q11
AT CONT		1C 180	Q12
AP/FD SYS 1 CONT		1C 17	Q13
AFCS 1 CONT		1C 19	Q14
FD1/FD2 1st PLT SW SUP		1C 27	Q15
AFCS TEST 1 28 V SUP		1C 383	R12
ADC 1 26 V SUP	2-213	1F 78	A 2
LAT ACCLMTR 1 26 V SUP		1C 42	A 4
AP/FD SYS 1 SUP		1C 20	C 5
AUTOSTAB 1 COMP SUP		1C 37	E 5
ADC 1 115 V SUP		1F 73	F 3

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
LDG DISPLAY SYS 1 SUP		1C 191	F 4
LH UC WEIGHT SW & DOWNLOCK "B" SYS SUP	3-213	G 293	B 8
RH UC WEIGHT SW "B" SYS SUP		G 294	B 9
NOSE U/C W/SW "B" SUP		G 296	D 8
AP/FD SYS 2 CONT	5-213	2C 17	A11
AFCS 2 CONT		2C 19	A12
FD1/FD2 2nd PLT SW SUP		2C 27	A13
AT CONT		2C 180	A14
WARN & LDG DISPLAY 2 SUP 1		2C 192	B11
WARN & LDG DISPLAY 2 SUP 2		2C 193	B12
AP/FD COMP 1 SUP	13-215	1C 18	A 5
AFCS MODE SYS 1 SUP		1C 273	B 5
TRIM COMP 1 SUP		1C 162	C 5
AT SYS 1 SUP		1C 179	C 6
AT SYNCHRO SYS 1 SUP		1C 181	D 5
AFCS TEST 1 115 V SUP		1C 384	D 6
AFCS TEST 115 V SUP		1C 163	E 5
SAFETY FLT CONT COMP No.1 115 V SUP		1C 652	E 6
SAFETY FLT CONT COMP No.1 26 V SUP		1C 653	F 6
TRIM SYNCHRO SYS 2 SUP	13-216	2C 163	A16
AP/FD SYS 2 SUP		2C 20	A17
LAT ACCELMTR 2 26 V SUP		2C 42	B16
AT SYNCHRO SYS 2 SUP		2C 181	B17
SAFETY FLT CONT COMP No.2 26 V SUP		2C 653	C16
SAFETY FLT CONT COMP No.2 115 V SUP		2C 652	C17
AT SYS 2 SUP		2C 179	D16
AUTOSTAB 2 COMP SUP		2C 37	D17
TRIM COMP 2 SUP		2C 162	E16
AFCS MODE SYS 2 SUP		2C 273	E17
ADC 2 26 V SUP		2F 78	F14
ADC 2 115 V SUP		2F 73	F15
LDG DISPLAY SYS 2 SUP		2C 191	F16
AFCS TEST 2 115 V SUP		2C 384	F17
AP/FD COMP 2 SUP		2C 18	F18





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ITEM Control and Indicator Panel
Figure 101

**ON A/C 001-001,

B. Not applicable.

R **ON A/C 002-007,

B. Reset the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14XS	2-213	X 355	H 2
NAV INS BUS 13XS	13-216	X 345	G 4

C. Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

D. On EQUIPMENT BAY COOLING panel, make certain that the electronics rack ventilation operates (Ref. 21-21-00).

3. Item Trouble Shooting

IFM Mode

```
*****************************************************
* Prepare system for trouble shooting as described  *
* in paragraph 2.                                   *
* Place FLIGHT-TEST ALL-TEST UNIT selector switches *
* in FLIGHT position.                               *
* Place both IFM-OFF-TEST selector switches         *
* in IFM position.                                  *
* Trip circuit breaker [1], [2].                    *
* Check in windows 2 and 6 that ITEM indications    *
* are displayed. IF                                 *
*****************************************************
   ||    |       ---------------------------------------------------
   ||    |      | One channel remains inoperative (no indication |
   OK    |-NOT OK--| displayed).                                  |
   ||           | Ref. Chart 101.                                 |
   ||            ---------------------------------------------------
*****************************************************
* Check that approximately one minute later ITEM    *
* indications disappear from windows 2 and 6. IF    *
*****************************************************
   ||    |       ---------------------------------------------------
   ||    |      | According to the defective side, replace        |
   OK    |-NOT OK--| ITEM computer No.1 [3] or No.2 [4].          |
   ||           | If still NOT OK, replace ITEM control unit      |
   ||           | [13].                                           |
   ||            ---------------------------------------------------
*****************************************************
* Press and hold side 1, then side 2, TEST IFM      *
* INDICATOR.                                        *
* Check that the following sequence of indications  *
* appears periodically in windows 2 and 6, then 1   *
* and 5.                                            *
* ITEM, PWR, AP-P, AP-A, FD-P, FD-A, AS-P, AS-R,    *
* AS-Y, ET, AT, INS, SFC, WLD, ADS, INST, CCP, HSI, *
* R-ALT, ILS. IF                                    *
*****************************************************
   ||    |       ---------------------------------------------------
   ||    |      | One indication not displayed during IFM         |
   OK    |-NOT OK--| indicator test.                              |
   ||           | Ref. Chart 102.                                 |
   ||            ---------------------------------------------------
   ||
   ||
   ||
   ||
```

```
   ||
**************************************************
* In IFM mode, these failures do not occur :      *
*                                                 *
* A. Display of an indication not associated with *
*    an AFCS equipment without disengagement in AFCS*
*                                                 *
* B. Display of an indication not associated with *
*    an AFCS equipment although unit involved     *
*    is healthy.                                  *
*                                                 *
* C. Display of an indication associated with an  *
*    AFCS equipment although the fault originates *
*    in a peripheral system.                      *
*                                                 *
* D. Spurious indications.                        *
**************************************************
    ||    |
    ||    |     ---------------------------------------------
    OK    |-NOT OK--| Replace relevant ITEM computer, No.1 [3], or |
    ||              | No.2 [4].                                    |
    ||          ---------------------------------------------
    ||
**************************************************
* Display of relevant indication when an AFCS system*
* is disconnected through internal monitoring. IF   *
**************************************************
    ||    |
    ||    |     ---------------------------------------------
    OK    |-NOT OK--| Ref. Chart 103.                          |
    ||          ---------------------------------------------
    ||
**************************************************
* Reset circuit breakers [1] and [2].             *
* Place both IFM-OFF-TEST switches in OFF position *
**************************************************
```

TEST Mode

```
****************************************************
* Place FLIGHT-TEST ALL-TEST UNIT selector switch  *
* in TEST UNIT position.                           *
* Place both IFM-OFF-TEST selector switches        *
* in TEST position.                                *
* Check that ITEM and TEST indications are correctly*
* displayed in side 1 windows 3 and 4, side 2      *
* windows 7 and 8. IF                              *
****************************************************
    ||    |
    ||    |        --------------------------------------------------
    ||    |        | One channel remains inoperative (no indication |
    OK    |-NOT OK--| displayed).                                    |
    ||             | Ref. Chart 101.                                |
    ||             --------------------------------------------------
    ||
****************************************************
* Trip circuit breakers [1] and [2].               *
* Check that side 1 windows 2 and 4, and side 2    *
* windows 6 and 8, illuminate in red. IF           *
****************************************************
    ||    |
    ||    |        --------------------------------------------------
    ||    |        | No warning resulting from incompatibility      |
    OK    |-NOT OK--| between TEST mode and simulated flight         |
    ||             | condition.                                     |
    ||             | Ref. Chart 104.                                |
    ||             --------------------------------------------------
****************************************************
* Place one IFM-OFF-TEST selector switch in OFF    *
* position to check the other channel.             *
* Reset circuit breakers [1] and [2].              *
* Check that ITEM and TEST indications are correctly*
* displayed in relevant windows.                   *
****************************************************
    ||    |
    ||    |        --------------------------------------------------
    ||    |        | Window 4 or 8 illuminates in red, and          |
    OK    |-NOT OK--| no indication is displayed in window 3 or 7.   |
    ||             | Ref. Chart 105.                                |
    ||             --------------------------------------------------
    ||
```

```
   ||
*****************************************************
* Check that approximately 2 minutes 30 seconds     *
* later, PASS indication replaces TEST indication.  *
* Therefore, displays are ITEM and PASS. IF         *
*****************************************************
   ||    |
   ||    |         --------------------------------------------------
   ||    |         | Display of FAIL indication in lieu of PASS     |
   OK    |-NOT OK--| indication.                                    |
   ||              | Replace ITEM computer No.1 [3] or No.2 [4].    |
   ||              --------------------------------------------------
   ||
*****************************************************
* Hold SELECT-START switch of chosen side           *
* in SELECT position.                               *
* Check that the following indications appear       *
* periodically in window 3 or 7.                    *
* SFC, AP-P, AP-A, AT, AS-P, AS-R, AS-Y, ET, WLD.   *
* IF                                                *
*****************************************************
   ||    |
   ||    |         --------------------------------------------------
   ||    |         | One indication not displayed in TEST mode      |
   OK    |-NOT OK--| selection test (SELECT-START switch).          |
   ||              | Ref. Chart 102.                                |
   ||              --------------------------------------------------
   ||
*****************************************************
* When WLD indication appears in window 3 or 7,     *
* release SELECT-START switch, place it in          *
* START position, then release it.                  *
* Check that PASS indication appears a few seconds  *
* later in window 4 or 8. IF                        *
*****************************************************
   ||    |
   ||    |         --------------------------------------------------
   ||    |         | Irrelevant display : PASS indication although  |
   ||    |         | WLD computer is inoperative or COMP            |
   OK    |-NOT OK--| indication although WLD computer is healthy.   |
   ||              | Ref. Chart 106.                                |
   ||              --------------------------------------------------
   ||
   ||
   ||
```


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```
    ||
    ||
*****************************************************
* Place IFM-OFF-TEST selector switch in OFF position*
* According to the selected channel :               *
* -Place ADC1 or ADC2 TEST selector switch in       *
* position 2. Approximately 1 minute later, reset   *
* by pressing associated caption light.             *
* -Place ANTISTALL SYSTEM No.1 or No.2 switch       *
* in ON position.                                   *
* -Place AUTOSTAB No.1 and AUTOSTAB No.2 control    *
* units PITCH, ROLL, and YAW levers in ON position. *
* -Place the four throttle control levers in        *
* max. thrust position.                             *
* Place FLIGHT-TEST ALL-TEST UNIT in TEST ALL       *
* position.                                         *
* Place (side 1 or side 2) IFM-OFF-TEST selector    *
* switch in TEST position.                          *
* Check that on each W & LD indicator, LAND 2 and   *
* LAND 3 capability caption lights illuminate       *
* and that AUTOLAND warning lights illuminate,      *
* although associated W & LD computer operates      *
* correctly. IF                                     *
*****************************************************
    ||    |
    ||    |      ---------------------------------------------------
    ||    |      | Replace associated ITEM computer, NO.1 [3]      |
   OK     |-NOT OK--| or No.2 [4].                                 |
    ||           | If still NOT OK, replace associated W & LD      |
    ||           | computer, No.1 [5], or No.2 [6].                |
    ||           ---------------------------------------------------
    ||
*****************************************************
* Check that ITEM and TEST indications appear in    *
* windows 3 and 4 or 7 and 8 and that 2 minutes 30  *
* seconds later ALL indication replaces ITEM        *
* indication.                                       *
* Therefore, displays are : ALL and TEST. IF        *
*****************************************************
    ||    |
    ||    |      ---------------------------------------------------
    ||    |      | Display of FAIL indication in lieu of TEST      |
    ||    |      | indication. Therefore, displays are :           |
   OK     |-NOT OK--| ITEM and FAIL.                               |
    ||           | Replace associated ITEM computer, No.1 [3]      |
    ||           | or No.2 [4].                                    |
    ||           ---------------------------------------------------
    ||
```

```
    ||
*****************************************************
* During test, the three Autostabilizer channel     *
* engage levers return to OFF position.             *
*****************************************************
    ||    |           ------------------------------------------------
    ||    |          | One or several axis (axes) of Autostabilizer   |
    ||    |          | channel does (do) not disengage.               |
    OK    |-NOT OK--| No other anomaly noticed on channel.           |
    ||               | Replace associated ITEM computer, No.1 [3]     |
    ||               | or No.2 [4].                                   |
    ||               | If still not OK, replace associated            |
    ||               | Autostabilizer computer No.1 [3] or No.2 [8].  |
    ||                ------------------------------------------------
*****************************************************
* Approximately 12 minutes 30 seconds later, check  *
* that ALL and PASS indications are displayed in    *
* windows 3 and 4 or 7 and 8, depending on the      *
* side considered. IF                               *
* NOTE : PASS indication may be replaced by another *
*        indication, for instance, ET, or several   *
*        indications, for instance ET, SFC, AT      *
*        the latter being cyclically displayed      *
*        at the end of test. It shows a fault       *
*        at tested channel(s) level.                *
*****************************************************
    ||    |           ------------------------------------------------
    ||    |          | PASS indication is displayed although          |
    ||    |          | one of the tested side channels is faulty.     |
    ||    |          | Replace associated ITEM computer No.1 [3]      |
    ||    |          | or No.2 [4].                                   |
    OK    |-NOT OK--| Irrelevant indication of tested side channel   |
    ||               | indication in lieu of PASS indication.         |
    ||               | Replace associated ITEM computer No.1 [3]      |
    ||               | or No.2 [4].                                   |
    ||               | If still NOT OK, replace relevant channel      |
    ||               | computer.                                      |
    ||                ================================================
*****************************************************
* Place tested side IFM-OFF-TEST selector switch    *
* in OFF position.                                  *
* Place FLIGHT-TEST ALL-TEST UNIT selector switch   *
* in FLIGHT position.                               *
* Restore the various channels and units used for   *
* the trouble shooting to initial condition.        *
*****************************************************
```

```
**************************************-------------------------------
* IN TEST MODE OR IFM MODE,          *| GROUND EQUIPMENT REQUIRED  |
* ONE CHANNEL REMAINS INOPERATIVE    *|----------------------------|
* (NO INDICATION DISPLAYED).         *| DESCRIPTION      PART NO.  |
**************************************|----------------------------|
                                      | MULTIMETER                 |
                                      ------------------------------

*****************************************************
* Trip then reset the following circuit breakers    *
* [9], [10], [11], [12].                            *
* Check if the channel becomes operative.           *
*****************************************************
    |    |
    |    |       ----------------------------------------
   NO YES--------| The channel is operational.          |
    |            ----------------------------------------
    |
*****************************************************
* On associated computer elapsed time indicator,    *
* check if pointer is pulsating (power supply).     *
* If not, remove computer from its rack.            *
* On rack connector AA, check voltage between       *
* terminals 13 and 14 (ground), and terminals       *
* 1 and 2 (neutral). Voltage readings are,          *
* respectively 28 VDC and 115 VAC.                  *
*****************************************************
    |    |       ----------------------------------------
    |    |       | If no supply from corresponding channel : |
   YES  NO-------| Replace faulty circuit breaker(s)    |
    |            | [9], [10], or [11], [12].            |
    |            ----------------------------------------
*****************************************************
* Replace the ITEM computer associated with the     *
* inoperative channel, No.1 [3], or No.2 [4].       *
* Check if faulty channel becomes operative.        *
*****************************************************
    |                                      |
   NO                                     YES
    |                                      |
----------------------------   -------------------------------------
| Replace ITEM control     |   | Replace removed computer by the   |
| unit [13].               |   | new one.                          |
----------------------------   -------------------------------------
```

Chart 101

ONE INDICATION NOT DISPLAYED DURING IFM INDICATOR TEST OR IN TEST MODE SELECTION TEST.

Press and release screen of window without display. Check on ejected window insert if the bulb corresponding with missing indication operates.

NO: Replace bulb then fully press window screen, once only, into position. The white spot on window must face the spot engraved on panel.

YES:

Replace ITEM computer of associated channel, No.1 [3] or No.2 [4]. Carry out check of IFM or TEST indications.

YES: Replace removed computer by the new one.

NO: Replace ITEM control unit [13].

Chart 102

```
**************************************-------------------------------
* NO DISPLAY OF RELEVANT INDICATION  *| GROUND EQUIPMENT REQUIRED   |
* WHEN AN AFCS SYSTEM IS DISCONNECTED*|-----------------------------|
* THROUGH INTERNAL MONITORING        *| DESCRIPTION        PART NO. |
**************************************|-----------------------------|
                                      | MULTIMETER                  |
                                      -------------------------------

*****************************************************
* Check if the FD channel associated with the       *
* faulty channel can be engaged and remains engaged.*
*****************************************************
     |   |       ------------------------------------------------
    YES  NO------| Refer to Autopilot Trouble Shooting (22-10-00).|
     |           ------------------------------------------------
     |
*****************************************************
* Disengage the FD channel.                         *
* For test purposes, remove associated ITEM         *
* computer No.1 [3] or No.2 [4].                    *
* At the end of autotest, ITEM indication disappears*
*****************************************************
     |   |
     |   |       ------------------------------------------------
    NO YES-------| Replace removed computer by the new one.      |
     |           ------------------------------------------------
*****************************************************
* ITEM channel No.1                                 *
* On test connector UT1837 of nose landing gear     *
* relay [14] ;                                      *
* check voltage on relay coil between terminals 4A  *
* and 4B (ground).                                  *
* ITEM channel No.2                                 *
* On test connector UT1838 of nose landing gear     *
* relay [15] ;                                      *
* check voltage on relay coil between terminals 12A *
* and 12B (ground).                                 *
*****************************************************
                          |
                          OV
                          |
-----------------------------------------------------------------
| Replace associated relay [14] or [15].                        |
| If still no warning triggered, refer to Trouble Shooting for  |
| Landing Gear and Doors Indicating (32-61-00).                 |
-----------------------------------------------------------------
```

Chart 103

```
*************************************-------------------------------
* NO WARNING RESULTING FROM          *| GROUND EQUIPMENT REQUIRED  |
* INCOMPATIBILITY BETWEEN TEST MODE  *|----------------------------|
* AND SIMULATED FLIGHT CONDITION.    *| DESCRIPTION       PART NO. |
**************************************|----------------------------|
                                      | MULTIMETER                 |
                                      ------------------------------

************************************************
* Check if associated FD (1 or 2) switch can be    *
* engaged and remains engaged.                     *
************************************************
    |   |        ------------------------------------------------
   YES  NO--------| Refer to Autopilot system trouble shooting  |
    |             | Ref. 22-10-00.                              |
    |             ------------------------------------------------
************************************************
* Disengage FD (1 or 2) switch.                    *
* For test purposes, replace associated ITEM       *
* computer No.1 [3] or No.2 [4].                   *
* Side 1 windows 2 and 4 or side 2 windows 6 and 8 *
* illuminate in red.                               *
************************************************
    |   |        ------------------------------------------------
    NO YES--------| Replace removed computer by the new one.     |
    |             ------------------------------------------------
************************************************
* For test purposes, replace ITEM control unit [13]*
* Side 1 windows 2 and 4 and side 2 windows 6 and 8*
* illuminate in red.                               *
************************************************
    |   |        ------------------------------------------------
    NO YES--------| Replace removed computer by the new one.     |
    |             ------------------------------------------------
************************************************
* ITEM channel No.1                                *
* On nose landing gear relay [14] test connector   *
* UT1837, check voltage on relay coil between      *
* terminals 4A and 4B (ground).                    *
* ITEM channel No.2                                *
* On nose landing gear relay [15] test connector   *
* UT1838, check voltage and relay coil between     *
* terminals 12A and 12B (ground).                  *
************************************************
                 |
                 0V
                 |
-------------------------------------------------------------------
| Replace associated landing gear relay [14] or [15].              |
| If still no warning triggered, refer to Trouble Shooting for     |
| Landing Gear and Doors Indicating (32-61-00).                    |
-------------------------------------------------------------------
```

Chart 104

```
*************************************-----------------------------
* WINDOW 4 OR 8 ILLUMINATES          *| GROUND EQUIPMENT REQUIRED  |
* IN RED.                            *|----------------------------|
* AND NO INDICATION IS DISPLAYED     *| DESCRIPTION       PART NO. |
* IN WINDOW 3 OR 7.                  *|----------------------------|
*************************************| MULTIMETER                 |
                                      -----------------------------


********************************************************
* Fort test purposes, replace associated ITEM          *
* computer No.1 [3] or No.2 [4].                       *
* ITEM and TEST indications are displayed.             *
********************************************************
    |   |          ----------------------------------------------
    NO YES---------| Replace removed computer by the new one.   |
    |              ----------------------------------------------
********************************************************
* For test purposes, replace ITEM control unit [13].   *
* ITEM and TEST indications are displayed.             *
********************************************************
    |   |          ----------------------------------------------
    NO YES---------| Replace removed control unit by the new one. |
    |              ----------------------------------------------
********************************************************
* ITEM channel No.1                                    *
* On test connector UT1837 of nose landing gear,       *
* check that the relay coil between terminals 4A       *
* and 4B (ground) is provided with 28 VDC supply       *
* ITEM channel No.2.                                   *
* On nose landing gear relay [15] ;                    *
* check that the relay coil between terminals 12A      *
* and 12B is provided with 28 VDC supply.              *
********************************************************
    |                                |
    NO                              YES
    |                                |
---------------------------   --------------------------------------
| Refer to Trouble Shooting|  | Replace nose landing gear relay    |
| for Landing Gear and     |  | [14] or [15].                      |
| Doors Indicating         |  --------------------------------------
| (32-61-00).              |
---------------------------
```

Chart 105

```
************************************
* IRRELEVANT DISPLAY :             *
* PASS INDICATION ALTHOUGH         *
* WLD COMPUTER IS INOPERATIVE      *
* OR COMP INDICATION ALTHOUGH      *
* WLD COMPUTER IS HEALTHY.         *
************************************


***************************************************
* For test purposes, replace associated           *
* ITEM computer, No.1 [3] or No.2 [4].            *
* The display of indications is correct.          *
***************************************************
    |                                      |
   YES                                     NO
    |                                      |
---------------------------  ------------------------------------
| Replace removed computer |  | Replace associated W & LD computer,|
| by the new one.          |  | No.1 [5] or No.2 [6].              |
---------------------------  ------------------------------------
```

Chart 106

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	WIRING DIAGRAM
[1] Circuit breaker 28 VDC		1-213	G291	Map Ref. M 16	24-50-00 R/I	
[2] Circuit breaker 28 VDC		3-213	G296	Map Ref. D 8	24-50-00 R/I	
[3] ITEM computer No.1	215 BS	4-215	1C381	Electro-nics Rack-LH	22-42-11 R/i	22-42-01 22-42-02 22-42-03
[4] ITEM Computer No.2	216 BS	4-216	2C381	Electro-nics Rack-RH	22-42-11 R/I	22-42-06 22-42-07 22-42-08
[5]W & LD computer No.1	215 BS	4-215	1C188	Electro-nics Rack-LH	22-41-11 R/I	22-42-01 22-42-02
[6]W & LD computer No.2	216 BS	4-216	2C188	Electro-nics Rack-RH	22-41-11 R/I	22-42-06 22-42-08
[7]Autostabili-zation computer No.1	215 AS	8-215	1C 31	Electro-nics Rack-LH	22-22-11 R/I	22-42-01
[8]Autostabili-zation computer No.2	216 AS	8-216	2C 31	Electro-nics Rack-RH	22-22-11 R/I	22-42-06
[9]Circuit breaker 28 VDC		1-213	1C383	Map Ref. R 12	24-50-00 R/I	22-42-01
[10]Circuit breaker 115 VAC		13-215	1C384	Map Ref. D 6	24-50-00 R/I	22-42-01
[11] Circuit breaker 28 VDC		5-213	2C383	Map Ref. F 11	24-50-00 R/I	22-42-06
[12]Circuit breaker 115 VAC		13-216	2C384	Map Ref. F 17	24-50-00 R/I	22-42-06

ITEM No. AND DESCRIPTION	ACCESS PANEL	PANEL/ ZONE	EQUIP. IDENT.	POSITION	MANUAL REF. MAINT. TOPIC	WIRING DIAGRAM
[13]ITEM control unit		8-214	C382	Flight Engineer's station (lower aft)	22-42-81 R/I	22-42-01 22-42-02 22-42-03 22-42-06 22-42-07 22-42-08
[14]Nose LG weight relay	124 AB	2-123	G299	Forward underfloor racking	32-00-00 R/I	32-61-06
[15]Nose LG weight relay	123 AB	3-123	G297	Forward underfloor racking	32-00-00 R/I	32-61-06

Component Identification
Table 101

INTEGRATED TEST AND MAINTENANCE SYSTEM (ITEM) - MAINTENANCE PRACTICES

In the event of the ITEM Computer not being obtainable, ITEM Shorting Connector 4BA22463 may be used.

This will provide the facility for normal AFCS operation of aircraft.

1. General

CAUTION : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, Servicing.

The ITEM control unit (C382) installed on the lower RH panel at the Flight Engineer's station, zone 8-214, is divided into four sections, in each of which are located two indicators. Removal/installation procedures for each indicator are identical.

2. Illuminating Display Indicator

A. Equipment and Materials

DESCRIPTION	PART NO.
Circuit Breaker Safety Clips	

B. Prepare

(1) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AFCS TEST 1 115V SUP	13-215	1C 384	D 6
AFCS TEST 2 115V SUP	13-216	2C 384	F17

C. Remove

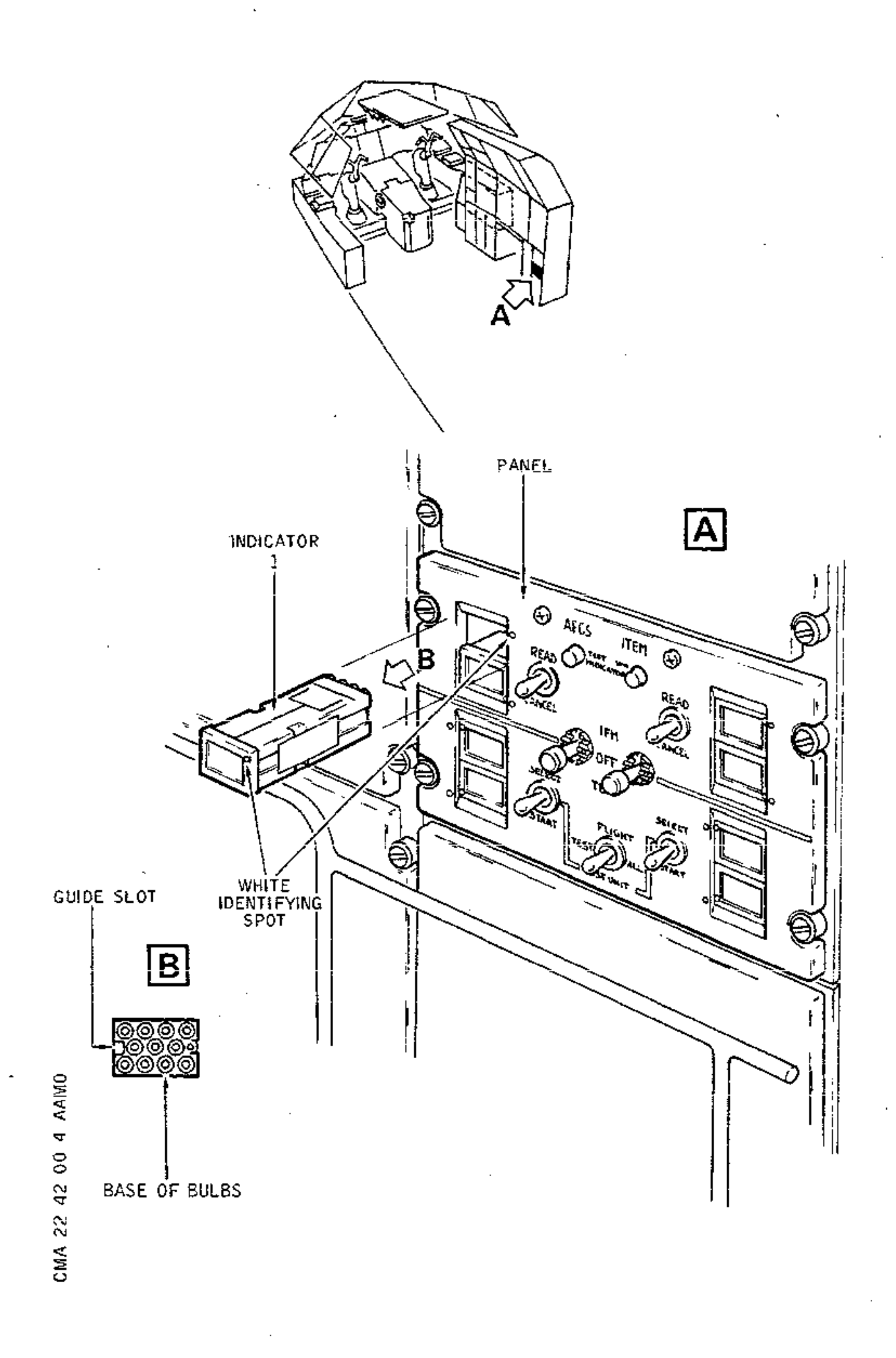
(1) Press appropriate indicator (1) and push in approximately 5 mm (0.197 in.) then release abruptly so as to eject indicator.

(2) Withdraw indicator (1) from its housing, noting position of guide slot and of white identifying spot.

(3) Check that no bulb is missing.

(4) Remove indicator.

D. Preparation of Replacement Component



Indicator Installation
Figure 401

(1) Visually check new indicator to make certain that there are no dents or corrosion and that all eleven bulbs are present.

(2) Check that correct indicator is to be installed by comparing position of white identifying spot and of guide slot.

E. Install

(1) Position indicator (1), making certain that position of white identifying spot on indicator corresponds to position of spot engraved on panel. Slide indicator (1) into housing.

(2) Push indicator (1) fully home into housing and release when click caused by indicator locking is heard.

CAUTION : AS INDICATOR WINDOW IS FRAGILE, IT IS RECOMMENDED TO PRESS INDICATOR SO THAT PRESSURE IS EXERTED EVENLY OVER WHOLE SURFACE OF WINDOW.

NOTE : If indicator does not lock in position, remove it entirely and repeat operation.

(3) Remove safety clips and tags and reset the circuit breakers tripped previously.

F. Test

(1) Depending on side and section (TEST or IFM) affected, carry out a check of indicators as described in 22-42-00, Adjustment/Test, Operational Test, paragraph 2C or 2D.

INTEGRATED TEST AND MAINTENANCE SYSTEM (ITEM) - ADJUSTMENT/TEST

1. General

WARNING : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN
R 22-00-00, SERVICING.

The Integrated Test and Maintenance System (ITEM) provides in
R flight automatic failure detection (IFM mode) as well as on
R the ground test (TEST mode) either of one item of equipment, if system is set on TEST UNIT, or of all AFCS system items of equipment, if system is set on TEST ALL.
The ITEM system is operated from the control unit located at Flight Engineer's station in RH lower panel. The ITEM control and indicator panel is divided into two identical parts of two quadrants each. On the LH part (side 1) is displayed AFCS system channel 1 condition while in the RH part (side 2) is displayed AFCS system channel 2 condition.

This test is carried out with the aircraft on the ground, shock absorbers compressed.

2. Operational Test

This test includes the following :

R - Check of TEST mode TEST UNIT function and associated indications
R - Test of IFM mode and associated indications
- Test of warning circuits for incompatibility of selector switches positions.

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.470 m (14 ft. 8 in.)	
Electrical Ground Power Unit	

B. Prepare

(1) Make certain that the following circuit breakers are reset.

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
NOSE UC WEIGHT SW "A" SYS SUP	1-213	G 291	M16
WARN & LDG DISPLAY 1 SUP1		1C 192	P13
WARN & LDG DISPLAY 1 SUP2		1C 193	P14
AP/FD SYST 1 CONT		1C 17	Q13
AFCS TEST 128 V SUP		1C 383	R12
R NOSE U/C W/SW "B" SUP	3-213	G 296	D 8
AP/FD SYS 2 CONT	5-213	2C 17	A11
WARN & LDG DISPLAY 2 SUP1		2C 192	B11
WARN & LDG DISPLAY 2 SUP2		2C 193	B12
AFCS TEST 2 28V SUP		2C 383	F11
AP/FD COMP 1 SUP	13-215	1C 18	A 5
AFCS TEST 1 115 V SUP		1C 384	D 6
LDG DISPLAY SYS 2 SUP		2C 191	F16
AFCS TEST 2 115 V SUP	13-216	2C 384	F17
AP/FD COMP 2 SUP		2C 18	F18

(2) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing).

R (3) AT Flight Engineer's station, on EQUIPMENT BAY COOLING panel, make certain that electronics rack ventilation operates. (Ref. 21-21-00).

C. Test of TEST UNIT function

(1) On control and indicator panel.

(a) Place IFM-OFF-TEST selector switches in TEST position.

NOTE : Both selector switches are of the pull-to-unlock type.

(b) Place middle FLIGHT-TEST ALL-TEST UNIT selector switch in TEST UNIT position.

(b1) Check that ITEM and TEST indications appear respectively in side 1 windows 3 and 4, side 2 windows 7 and 8.

(b2) Wait 2 minutes 30 seconds approximately (delay for ITEM autotest and initializing).

NOTE: During the first minute, a slight flicker in display is normal.

(b3) After these 2 minutes 30 seconds, check that PASS indication replaces TEST indication.

NOTE : If FAIL indication replaces PASS indication in windows 4 or/and 8, autotest is ineffective (associated computer(s) malfunctioning).

(c) Place then hold side 1 (side 2) START/SELECT switch in SELECT position.

(d) Display indications associated with AFCS systems. These indications appear in side 1 window 3 (side 2 window 7) at the rate of three seconds approximately per indication in the following sequence :

SEQUENCE	MEANING
SFC	Safety Flight Control Computer
AP.P	AP/FD Pitch Computer
AP.A	AP/FD Azimuth Computer
AT	Autothrottle Computer
AS.P	Autostabilizer-Pitch axis
AS.R	Autostabilizer-Roll axis
AS.Y	Autostabilizer-Yaw axis
ET	Electric Trim

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SEQUENCE	MEANING
WLD	Warning and Landing Display Computer

(e) Release side 1 (side 2) SELECT/START switch when WLD appears in side 1 window 3 (side 2 window 7).

- Check that WLD indication remains displayed.

(f) Place side 1 (side 2) SELECT/START switch in START position, then release it.

(f1) Check that in side 1 window 4 (side 2 window 8) TEST indication replaces PASS indication.

(f2) Check in side 1 window 4 (side 2 window 8) that, after a few seconds, PASS indication replaces TEST indication. (Displayed indications will be "WLD - PASS")

(g) Place side 1 (side 2) IFM-OFF-TEST selector switch in OFF position.

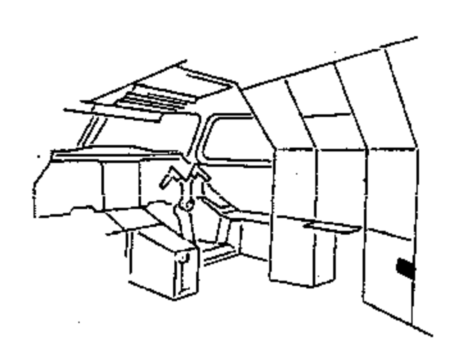
NOTE : When PASS information replaces TEST and IFM-OFF-TEST selector switch is placed in OFF position, AP and AT warnings appear while aural warning sounds.

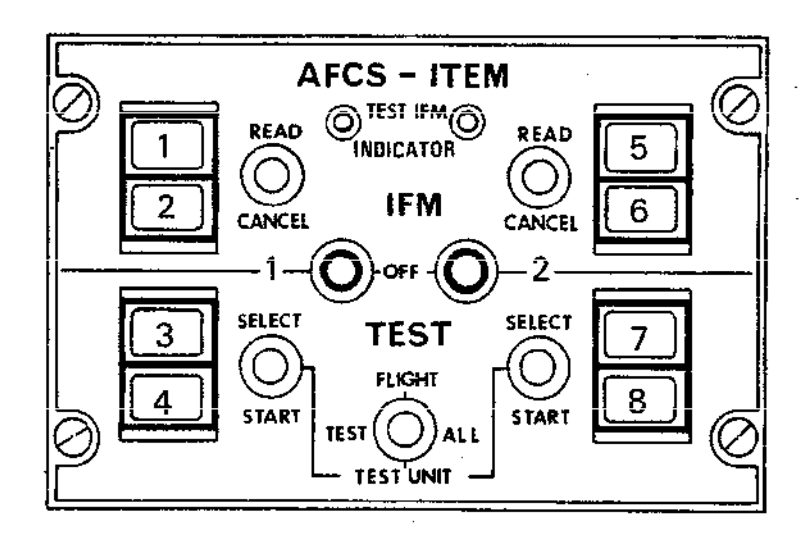
(g1) Check that WLD and PASS indications disappear from side 1 windows 3 and 4 (side 2 windows 7 and 8).

(g2) Check that side 1 windows 2 and 4 (side 2 windows 6 and 8) illuminate in red.

(h) Repeat the operations described from 2C (1) (c) through 2C (1) (g1) (g2), using side 2 SELECT - START switch and taking into account the information given in brackets.
The results must be identical.

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R Item Control and Indicator Panel
Figure 501

R D. Test of IFM mode indications
R

(1) On control and indicator panel

(a) Place FLIGHT-TEST ALL-TEST UNIT middle selector switch in FLIGHT position.

(b) Place both IFM-OFF-TEST selector switches in IFM position.

(b1) Check that ITEM indication is displayed
R in side 1 window 2 and in side 2 window 6.

R (b2) Approximately 1 minute later (delay for ITEM
R autotest), check that ITEM indication dis-
R appears from side 1 window 2 and side 2
R window 6.

<u>NOTE</u> : If ITEM indication remains displayed
R in windows 2 or/and 6, autotest is ineffective (malfunction of associated computer).

(c) Place and hold side 1 READ/CANCEL switch in READ position

- Check that IFM mode indication does not appear
R on windows 1 and 2.

(d) Release side 1 READ/CANCEL switch ; it must return to neutral position (mechanical return).

(e) Place and hold side 2 READ/CANCEL switch in READ position.

(e1) Check that no IFM mode indication is dis-
R played on windows 5 and 6.

R <u>NOTE</u> : If IFM mode indication appears in
R previously mentioned windows, after checking that this indication is not associated any longer with a failure, place READ/CANCEL switch of selected side in CANCEL position then release it in order to cancel IFM mode indication.

(f) Press side 1 TEST IFM INDICATOR switch

R (f1) Check in side 1 windows 1 and 2 (side 2

R windows 5 and 6) that IFM mode indications appear at a rate of approximately 3 seconds per indication in the following sequence :

	DISPLAY	FUNCTION	WINDOWS SIDE 1	WINDOWS SIDE 2
R	ITEM	Autotest	2	6
R	PWR	115VAC & 28VDC Power Supplies	1	5
	AP.P	AP Pitch Computer	1	5
	AP.A	AP Azimuth Computer	1	5
	FD.P	FD Pitch Computer	1	5
	FD.A	FD Azimuth Computer	1	5
	AS.P	Autostabilizer-Pitch	1	5
	AS.R	Autostabilizer-Roll	1	5
	AS.Y	Autostabilizer-Yaw	1	5
	ET	Electric Trim	1	5
	AT	Autothrottle	1	5
R	INS	Inertial Navigation System & ISCU	1	5
R	SFC	Safety Flight Control Computer	1	5
	WLD	Warning and Landing Display	2	6
	ADS	Air Data System	2	6
R	INST	VSI or Altimeter	2	6
	C.CP	Compass Coupler	2	6
R	HSI	Horizontal Situation Instrument	2	6
	R.ALT	Radio Altimeter	2	6
R	ILS	LOC or Glide receiver	2	6

(g) Release side 1 TEST IFM INDICATOR switch.

(h) Press side 2 TEST IFM INDICATOR switch.

(h1) Check that IFM mode indications and sequence are similar to those of side 1. The results must be identical.

E. Test of Warning Circuits

(1) On control and indicator panel

(a) Place both IFM-OFF-TEST selector switches in TEST position.

(b) Place middle selector switch FLIGHT-TEST ALL-TEST UNIT in FLIGHT position.

R (b1) Windows 2 - 4 - 6 and 8 must illuminate in red.

(c) Place both IFM-OFF-TEST selector switches in OFF position.

R (c1) Windows 2 - 4 - 6 and 8 must not be illuminated in red any longer.

(d) Place both IFM-OFF-TEST selector switches in IFM position.

(e) Place middle selector switch FLIGHT-TEST ALL-TEST UNIT in TEST ALL position.

R (e1) Windows 2 - 4 - 6 - 8 must illuminate in red.

(f) Place middle selector switch FLIGHT-TEST ALL-TEST UNIT in TEST UNIT position.

R (f1) Windows 2 - 4 - 6 - 8 remain illuminated in red.

(g) Place both IFM-OFF-TEST selector switches in OFF position.

(h) Place middle selector switch FLIGHT-TEST ALL-TEST UNIT in FLIGHT position.

R (h1) Windows 2 - 4 - 6 - 8 must not illuminate in red any longer.

(i) Trip, safety and tag the following circuit breakers

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
NOSE UC WEIGHT SW "A" SUP	1-213	G 291	M16
R NOSE U/C W/SW "B" SUP	3-213	G 296	D 8

(j) Place both IFM-OFF-TEST selector switches in TEST position.

R (j1) Windows 2 - 4 - 6 - 8 must illuminate in red.

(k) Place middle selector switch FLIGHT-TEST ALL-TEST UNIT in TEST ALL position.

R (k1) Windows 2 - 4 - 6 - 8 remain illuminated in red.

(l) Place both IFM-OFF-TEST selector switches in IFM position.

R (l1) Windows 2 - 4 - 6 - 8 remain illuminated in red.

(m) Place both IFM-OFF-TEST selector switches in OFF position.

(n) Place middle selector switch FLIGHT-TEST ALL-TEST UNIT in FLIGHT position.

(o) Remove safety clips and tags and reset previous-
R ly mentioned circuit breakers G291 and G296.

R (o1) Windows 2 - 4 - 6 - 8 must not illuminate in red any longer.

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F. Close-Up

R (1) Disconnect electrical ground power unit and de-energize the aircraft electrical network (Ref. 24-41-00, Servicing).

(2) Remove access platform.

3. Functional Test

This test includes the following two parts :

- Check of TEST mode TEST ALL function and TEST UNIT function as carried out in the operational test.
- Check of IFM mode, including check of IFM mode indicating as carried out in the operational test.

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.470 m (14 ft. 8 in)	
Access Platform 3.220 m (10 ft. 7 in)	
Radio Altimeter Ground Test Unit	
Safety Clips.	
Electrical Ground Power Unit	

B. Prepare

**ON A/C 001-001,

(1) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
COMPAS COUPLER SYS1 SW SUP	1-213	1F 134	F14
DEV1 & 2 1ST PLT SW SUP		1R 38	G14
INS COMPTR SUP & IND		F 5	G15
NOSE UC WEIGHT SW "A" SYS SUP		G 291	M16
LH UC WEIGHT SW "A" SYS SUP		G 292	M17
RH UC WEIGHT SW & DOWNLOCK "A" SYS SUP		G 295	M18
AUDIO WARN SYS SUP1		W 371	M21
MWS SUP1		W 252	N21
ADC 28V SUP		1F 74	P12
WARN & LDG DISPLAY SUP1		1C 192	P13
WARN & LDG DISPLAY SUP2		1C 193	P14
TRIM 1 CONT		1C 161	Q11

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AT CONT		1C 180	Q12
AP/FD SYS1 CONT		1C 17	Q13
AFCS 1 CONT		1C 19	Q14
FD1/FD2 1ST PLT SW SUP		1C 27	Q15
AFCS TEST 1 28V SUP		1C 383	R12
1ST PLT ADC INST SUP	2-213	1F 75	A 1
ADC 1 26V SUP		1F 78	A 2
1ST PLT VSI SUP		1F 97	A 3
INS COMPTR SUP2		F 3	A 6
LAT ACCLMTR 1 26V SUP		1C 42	B 4
HSI TRUE 1ST PLT INS 1 SUP & IND		1F 21	B 6
RMI VHF NAV 1 IND		1R 34	C 6
ADF 1 IND		1R 174	C 7
RAD ALT 1 SUP		1S 56	D 7
AUTOSTAB 1 COMP SUP		1C 37	E 5
ADC 1 115V SUP		1F 73	F 3
LDG DISPLAY SYS 1 SUP		1C 191	F 4
INS COMPTR SUP1		F 4	F 7
COMPASS COUPLER 1 SUP		1F 130	F 8
ILS VHF NAV 1 SUP		1R 25	G 6
VOR VHF NAV 1 SUP		1R 33	G 7
LH UC WEIGHT SW & DOWNLOCK "B" SYS SUP	3-213	G 293	B 8
RH UC WEIGHT SW "B" SYS SUP		G 294	B 9
NOSE U/C W/SW "B" SUP		G 296	D 8
AP/FD SYS2 CONT	5-213	2C 17	A11
AFCS 2 CONT		2C 19	A12
FD1/FD2 2ND PLT SW SUP		2C 27	A13
AT CONT		2C 180	A14
WARN & LDG DISPLAY 2 SUP1		2C 192	B11
WARN & LDG DISPLAY 2 SUP2		2C 193	B12
TRIM 2 CONT		2C 161	B13
AUDIO WARN SYS SUP2		W 372	C17
MWS SUP2		W 251	D15
SAFETY FLT CONT No.2 SUP		2C 651	D17
AFCS TEST 2 28V SUP		2C 383	F11
ADC 2 28V SUP		2F 74	F12
AP/FD COMP 1 SUP	13-215	1C 18	A 5
AFCS MODE SYS 1 SUP		1C 273	B 5
COMPASS COUPLER 2 STBY SUP		2F 131	B 7

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
TRIM COMP 1 SUP		1C 162	C 5
AT SYS 1 SUP		1C 179	C 6
AT SYNCHRO SYS1 SUP		1C 181	D 5
AFCS TEST 1 115V SUP		1C 384	D 6
TRIM SYNCHRO SYS 1 SUP		1C 163	E 5
SAFETY FLT CONT COMP No.1 115V SUP		1C 652	E 6
SAFETY FLT CONT COMP No.1 26V SUP		1C 653	F 6
AP/FD SYS 1 SUP		1C 20	F15
RAD ALT 1 & 2 IND	15-215	S 57	G 5
3 CM STN CTR LH TEST SUP		L1006	D14
PLTS LT TEST SUP		L1001	E14
2ND PLT INST SUP	13-216	2F 75	A14
ADC 2 26V SUP		2F 78	A15
TRIM SYNCHRO SYS 2 SUP		2C 163	A16
AP/FD SYS 2 SUP		2C 20	A17
ADF 2 IND		2R 174	A18
RMI VHF NAV 2 IND		2R 34	A19
2ND PLT VSI SUP		2F 97	B13
INS COMPTR SUP3		F 2	B15
LAT ACCELMTR 2 26V SUP		2C 42	B16
AT SYNCHRO SYS 2 SUP		2C 181	B17
HSI TRUE 2ND PLT INS2 SUP & IND		2F 21	C15
SAFETY FLT CONT COMP No.2 26V SUP		2C 653	C16
SAFETY FLT CONT COMP No.2 115V SUP		2C 652	C17
COMPASS COUPLER 2 NORM SUP		2F 130	D15
AT SYS 2 SUP		2C 179	D16
AUTOSTAB 2 COMP SUP		2C 37	D17
VOR VHF NAV2 SUP		2R 33	E14
ILS VHF NAV2 SUP		2R 25	E15
TRIM COMP 2 SUP		2C 162	E16
AFCS MODE SYS 2 SUP		2C 273	E17
ADC 2 115V SUP		2F 73	F15
LDG DISPLAY SYS2 SUP		2C 191	F16
AFCS TEST2 115V SUP		2C 384	F17
AP/FD COMP 2 SUP		2C 18	F18
RAD ALT 2 SUP		2S 56	F19
COMPASS COUPLER SYS 2 SW SUP	15-216	2F 134	A21

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
DEV 1 & 2 2ND PLT SW SUP		2R 38	F21

R **ON A/C 002-007,

(1) Make certain that the following circuit breakers are set :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
COMPAS COUPLER SYS1 SW SUP	1-213	1F 134	F14
DEV1 & 2 1ST PLT SW SUP		1R 38	G14
INS COMPTR SUP & IND		F 5	G15
NOSE UC WEIGHT SW "A" SYS SUP		G 291	M16
LH UC WEIGHT SW "A" SYS SUP		G 292	M17
RH UC WEIGHT SW & DOWNLOCK "A" SYS SUP		G 295	M18
AUDIO WARN SYS SUP1		W 371	M21
MWS SUP1		W 252	N21
ADC 28V SUP		1F 74	P12
WARN & LDG DISPLAY SUP1		1C 192	P13
WARN & LDG DISPLAY SUP2		1C 193	P14
TRIM 1 CONT		1C 161	Q11
AT CONT		1C 180	Q12
AP/FD SYS1 CONT		1C 17	Q13
AFCS 1 CONT		1C 19	Q14
FD1/FD2 1ST PLT SW SUP		1C 27	Q15
AFCS TEST 1 28V SUP		1C 383	R12
ADC 1 26V SUP	2-213	1F 78	A 2
1ST PLT VSI SUP		1F 97	A 3
LAT ACCLMTR 126V SUP		1C 42	A 4
INS COMPTR SUP2		F 3	A 6
1ST PLT ADC INST SUP		1F 75	B 3
HSI TRUE 1ST PLT INS 1 SUP & IND		1F 21	B 6
RMI VHF NAV 1 IND		1R 34	C 6
ADF 1 IND		1R 174	C 7
RAD ALT 1 SUP		1S 56	D 8
AUTOSTAB 1 COMP SUP		1C 37	E 5
ADC 1 115V SUP		1F 73	F 3
LDG DISPLAY SYS 1 SUP		1C 191	F 4

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
INS COMPTR SUP1		F 4	F 7
COMPASS COUPLER 1 SUP		1F 130	F 8
ILS VHF NAV 1 SUP		1R 25	G 7
VOR VHF NAV 1 SUP		1R 33	G 8
LH UC WEIGHT SW & DOWNLOCK "B" SYS SUP	3-213	G 293	B 8
RH UC WEIGHT SW "B" SYS SUP		G 294	B 9
NOSE U/C W/SW "B" SUP		G 296	D 8
AP/FD SYS2 CONT	5-213	2C 17	A11
AFCS 2 CONT		2C 19	A12
FD1/FD2 2ND PLT SW SUP		2C 27	A13
AT CONT		2C 180	A14
WARN & LDG DISPLAY 2 SUP1		2C 192	B11
WARN & LDG DISPLAY 2 SUP2		2C 193	B12
TRIM 2 CONT		2C 161	B13
AUDIO WARN SYS SUP2		W 372	C17
MWS SUP2		W 251	D15
SAFETY FLT CONT No.2 SUP		2C 651	D17
AFCS TEST 2 28V SUP		2C 383	F11
ADC 2 28V SUP		2F 74	F12
AP/FD COMP 1 SUP	13-215	1C 18	A 5
AFCS MODE SYS 1 SUP		1C 273	B 5
COMPASS COUPLER 2 STBY SUP		2F 131	B 7
TRIM COMP 1 SUP		1C 162	C 5
AT SYS 1 SUP		1C 179	C 6
AT SYNCHRO SYS1 SUP		1C 181	D 5
AFCS TEST 1 115V SUP		1C 384	D 6
TRIM SYNCHRO SYS 1 SUP		1C 163	E 5
SAFETY FLT CONT COMP No.1 115V SUP		1C 652	E 6
SAFETY FLT CONT COMP No.1 26V SUP		1C 653	F 6
RAD ALT 1 & 2 IND	15-215	S 57	G 5
3 CM STN CTR LH TEST SUP		L1006	D14
PLTS LT TEST SUP		L1001	E14
2ND PLT INST SUP	13-216	2F 75	A14
TRIM SYNCHRO SYS 2 SUP		2C 163	A16
AP/FD SYS 2 SUP		2C 20	A17
ADF 2 IND		2R 174	A18
RMI VHF NAV 2 IND		2R 34	A19

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
2ND PLT VSI SUP		2F 97	B13
INS COMPTR SUP3		F 2	B15
LAT ACCELMTR 2 26V SUP		2C 42	B16
AT SYNCHRO SYS 2 SUP		2C 181	B17
HSI TRUE 2ND PLT INS2 SUP & IND		2F 21	C15
SAFETY FLT CONT COMP No.2 26V SUP		2C 653	C16
SAFETY FLT CONT COMP No.2 115V SUP		2C 652	C17
COMPASS COUPLER 2 NORM SUP		2F 130	D15
AT SYS 2 SUP		2C 179	D16
AUTOSTAB 2 COMP SUP		2C 37	D17
VOR VHF NAV2 SUP		2R 33	E14
ILS VHF NAV2 SUP		2R 25	E15
TRIM COMP 2 SUP		2C 162	E16
AFCS MODE SYS 2 SUP		2C 273	E17
ADC 2 26V SUP		2F 78	F14
ADC 2 115V SUP		2F 73	F15
LDG DISPLAY SYS2 SUP		2C 191	F16
AFCS TEST2 115V SUP		2C 384	F17
AP/FD COMP 2 SUP		2C 18	F18
RAD ALT 2 SUP		2S 56	F19
COMPASS COUPLER SYS 2 SW SUP	15-216	2F 134	A21
DEV 1 & 2 2ND PLT SW SUP		2R 38	F21

**ON A/C 001-001,

(2) Not applicable

R **ON A/C 002-007,

(2) Reset the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14 X S	2-213	X 355	H 2
NAV INS BUS 13 X S	13-216	X 345	G 4

(3) Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, Servicing)

(4) At Flight Engineer's station, on EQUIPMENT BAY COOLING panel, make certain that electronics rack ventilation operates (Ref. 21-21-00).

C. Check of TEST ALL function

(1) On ADC control panel

(a) Place ADC 1 and ADC 2 switches in ON position.

(b) Place both TEST selector switches in position 2.

(c) Approximately one minute later, reset by pressing ADC 1 and ADC 2 caption lights.

(2) On ceiling panel

(a) On flight control unit, place ANTISTALL SYSTEM and 2 switches in ON position.

(b) On both AUTOSTAB No.1 and No.2 control units, engage PITCH, ROLL, and YAW levers.

- SYST 1 FAIL and SYST 2 FAIL caption lights must extinguish.

(c) Place the four AUTOTHROTTLE isolation switches in ON position

(3) Place the four throttle control levers in max. thrust position.

(4) On ITEM control and indicator panel.

(a) Place both IFM-OFF-TEST selector switches in TEST position.

(b) Place FLIGHT-TEST ALL-TEST UNIT selector switch in TEST ALL position.

- On both Warning and Landing Display indicators, LAND 2 and LAND 3 capability caption lights illuminate.

- On panels 3-211 and 3-212, both AUTOLAND warning lights illuminate.

CAUTION : DURING TEST, AUTOSTAB NO.1 AND NO.2

PITCH, ROLL, AND YAW LEVERS RETURN TO OFF POSITION. DO NOT RE-ENGAGE.

(c) Check that ITEM and TEST indications appear respectively in side 1 windows 3 and 4, side 2 windows 7 and 8.

(d) Approximately 2 minutes 30 seconds later, ALL indication appears in lieu of ITEM indication in windows 3 and 7.

NOTE : If FAIL indication appears in lieu of TEST indication in windows 4 and/or 8, autotest is ineffective.

(e) Check that approximately 12 minutes 30 seconds later, PASS indication appears in lieu of TEST in windows 4 and 8.

NOTE : As the ITEM system detects failure(s), ALL and PASS indications are replaced by the legend of the channel(s) concerned together with the legend of the faulty LRU as indicated in the table below :

FUNCTION	DISPLAY WINDOW				FUNCTION
	SIDE1 3	SIDE2 7	SIDE1 4	SIDE2 8	
Autotest	ITEM ITEM		TEST FAIL		Test in progress. Unit(s) being tested failed
Test all systems	ALL		PASS		Unit(s) being tested correct
Test Pitch AP/FD	AP-P		COMP LAND		Computer being tested or land mode failed
Test Azimuth AP/FD	AP-A		COMP LAND		Computer being tested or land mode failed
Test Autothrottle	AT		COMP ACCL		Computer being tested or Accelerometer failed

FUNCTION	DISPLAY WINDOW				FUNCTION
	SIDE1	SIDE2	SIDE1	SIDE2	
	3	7	4	8	
Test Autostab Pitch	AS-P		COMP GYRO GYRM		Computer being tested or Gyro(s) failed
Test Autostab Roll	AS-R		COMP GYRO		Computer being tested or Gyro failed
Test Autostab Yaw	AS-Y		COMP GYRO ACCL		Computer being tested or Gyro, or Accelerometer failed
Test Electric Trim	ET		COMP		Computer being tested failed
Test Warning & Landing Display	W-LD		COMP		Computer being tested failed
Safety flight control computer	SFC		COMP		Computer being tested failed

(f) Place both IFM-OFF-TEST selector switches in OFF position.

- Check that ALL and PASS indications disappear from windows.
- Check that windows 2-4-6-8 illuminate in red.
- Check on both WLD indicators that AP and AT warning lights illuminate while the cavalry charge aural warning is triggered. The latter is only associated with AP warning

(g) Cancel AP and AT warning by pressing corresponding warning lights.

(h) Place both IFM-OFF-TEST selector switches in TEST position.

(i) Place FLIGHT-TEST ALL-TEST UNIT selector switch in TEST UNIT position, then proceed with the check carried out in the Operational Test, from 2 C (1) (b) (b1) through 2 C (1) (h). The results must be

identical.

(5) On ADC control panel

(a) Place both TEST selector switches in NORM position

(b) Approximately one minute later, press ADC 1 and ADC 2 caption lights to reset.

D. Check of IFM mode

(1) Make certain that control surfaces deflection area is clear.

(2) Pressurize Blue hydraulic system (Ref. 29-12-00, Servicing) and Green hydraulic System (Ref. 29-11-00, Servicing).

(3) Operate flight controls in blue electrical mode (Ref. 27-00-00, Servicing).

(4) Energize the three Inertial Navigation Systems by placing associated MSU switches in ALIGN position (Ref. 34-45-00, Adjustment/Test).

(5) Unlock and open lower baggage compartment door (Ref. 52-31-21, Adjustment/Test), then connect radio altimeter ground test unit to radio altimeter No.1 (Ref. 34-42-00, Adjustment/Test).

(6) On Captain's instrument panel, place switches :

ATT-INS 1/INS 3 in position INS 1
COMP 1/COMP 2 in position COMP 1
DEV 1/DEV 2 in position DEV 1
NAV INS 1/INS 2 in position INS 1.

(7) On First Officer's instrument panel, place switches :

ATT INS 2/INS 3 in position INS 2
COMP 1/COMP 2 in position COMP 2
DEV 1/DEV 2 in position DEV 2
NAV INS 1/INS 2 in position INS 2.

(8) Check that :

(a) On Captain's and First Officer's ADIs, flags G are out of view.

(b) On Captain's and First Officer's HSIs, compass flags are out of view.

(c) On Captain's and First Officer's RMIs, compass flags are out of view.

(9) Place the four throttle control levers in mid-way position.

(10) Place the three trim controls :

Pitch, roll, and yaw in zero degree position.

(11) Engage PITCH, ROLL, and YAW levers of AUTOSTAB No.1 and AUTOSTAB No.2 control units.

- SYST 1 FAIL and SYST 2 FAIL caption lights must extinguish.

(12) Engage ELECTRIC TRIM control unit switches 1 and 2.

(13) On AFCS control unit, engage switches AT1, AT2, AP1, FD1, and FD2.

(a) On AFCS control unit AUTOTHROTTLE section, IAS HOLD mode selection push-button illuminates.

(b) On AFCS control unit AP/FD section, PITCH HOLD and HDG HOLD mode selection push-buttons illuminate.

(14) On ITEM control and indicator panel.

(a) Place FLIGHT-TEST ALL-TEST UNIT selector switch in FLIGHT position.

(b) Place both IFM-OFF-TEST selector switches in IFM position.

(c) Check that windows 2-4-6-8 are not illuminated in red.

(d) Check that ITEM indication appears in windows 2 and 6.

(15) Approximately 1 minute later, check that ITEM indication disappears from windows 2 and 6, then check IFM indications as described in Operational Test from 2 D (1) (c) throught 2 D (1) (h). The results must be identical.

(16) Trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
NOSE UC WEIGHT SW 'A' SYS SUP	1-213	G 291	M16
NOSE U/C W/SW 'B' SUP	2-213	G 296	D 8

(17) On ADC control panel, place ADC 1 TEST selector switch in position 1.

(a) AUTOSTAB No.1 control unit PITCH and YAW levers return to OFF position.

- SYST 1 FAIL caption light illuminates.

(b) ELECTRIC TRIM control unit switch 1 returns to OFF position.

(c) On AFCS control unit, AT1, AP1, and FD1 disengage.

(d) On ITEM control and indicator panel, ADS indication must appear in window 2.

(d1) Place side 1 READ-CANCEL switch in CANCEL position.

- ADS indication must disappear

(e) On master warning panel, and on both warning and Landing Display indicators, cancel the warnings associated with the disengaged channels.

NOTE : Unless specified, the test procedure described below includes neither engage switch, mode selection push-button, control unit lights status, nor warnings resulting from the various disengagements.

(18) On AFCS control unit, engage AP2 switch.

(19) On ADC control panel, place ADC 2 TEST selector switch in position 1.

(a) AUTOSTAB No.2 control unit PITCH and YAW levers return to OFF position.

- SYST 2 FAIL caption light illuminates.

(b) ELECTRIC TRIM control unit switch 2 returns to OFF position.

(c) On AFCS control unit, AT2, AP2, and FD 2 switches disengage.

(d) On ITEM control and indicator panel, ADS indication must appear in window 6.

(d1) Place side 2 READ/CANCEL switch in CANCEL po-

sition.

- ADS indication must disappear.

(20) On ADC control panel, place both TEST selector switches in NORM position.

(a) Approximately 30 seconds later, press ADC 1 and ADC 2 caption lights to reset.

(21) Engage PITCH and YAW levers of AUTOSTAB No.1 and AUTOSTAB No.2 control units.

(a) SYST 1 FAIL and SYST 2 FAIL caption lights must extinguish.

(22) Engage ELECTRIC TRIM control unit switches 1 and 2.

(23) On AFCS control unit, engage AT1, AT2, AP1, FD1 and FD2 switches.

(a) Select VERT SPEED mode.

(24) On circuit breaker panel 2-213, trip then reset circuit breaker 1F97, map ref. A3.

(a) AP1 and FD1 switches disengage.

(b) On ITEM control and indicator panel, INST indication must appear in window 2.

(b1) Place side 1 READ-CANCEL switch in CANCEL position.

- INST indication must disappear.

(25) On AFCS control unit, engage AP2 switch.

(a) Selct VERT SPEED mode.

(26) On circuit breaker panel 13-216, trip then reset circuit breaker 2F97, map ref. B13.

(a) AP2 and FD2 switches disengage.

(b) On ITEM control and indicator panel, INST indication must appear in window 6.

(b1) Place side 2 READ-CANCEL switch in CANCEL position.

- INST indication must disappear.

(27) On AFCS control unit, engage AP1, FD1, and FD2 switches

(a) Place both HDG-TRK push-pull knobs in TRK position

(b) Select HDG-TRK mode.

(28) On circuit breaker panel 2-213, trip then reset circuit breaker 1F21, map ref, B6.

(a) Ap1 and FD1 switches disengage.

(b) On ITEM control and indicator panel, INS indication must appear in window 1.

(b1) Place side 1 READ - CANCEL switch in CANCEL position.

- INS indication must disappear.

(29) On AFCS control unit, engage AP2 switch.

(a) Select HDG - TRK mode.

(30) On circuit breaker panel 13-216, trip then reset circuit breaker 2F21, map ref. C15.

(a) AP2 and FD2 switches disengage.

(b) On ITEM control and indicator panel, INS indication must appear in window 5.

(b1) Place side 2 READ-CANCEL switch in CANCEL position.

- INS indication must disappear.

(31) On AFCS control unit, engage AP1, FD1, and FD2 switches

(32) On radio altimeter ground test unit, simulate an altitude of 2000 ft.

(32) On panel 5-211, place both RAD-INS selector switches in RAD position, then select HDG-TRK mode on AFCS control unit.

(34) On Captain's HSI, press then release TEST push-button.

(a) AP1 and FD1 switches disengage.

(b) On ITEM control and indicator panel, HSI indication must appear in window 2.

(b1) Place side 1 READ-CANCEL switch in CANCEL position.

- HSI indication must disappear.

(35) On AFCS control unit, engage AP2 switch.

(a) Select HDG-TRK mode.

(36) On First Officer's HSI, press then release TEST pushbutton.

(a) AP2 and FD2 switches disengage.

(b) On ITEM control and indicator panel, HSI indication must appear in window 6.

(b1) Place side 2 READ-CANCEL switch in CANCEL position.

- HSI indication must disappear.

(37) On AFCS control unit, engage switches AP1, FD1, and FD2

(38) On circuit breaker panel 2-213, trip then reset circuit breaker 1F130, map ref. F8.

(a) AP1 and FD1 switches disengage.

(b) On ITEM control and indicator panel, C. CP indication must appear in window 2.

(b1) Place side 1 READ-CANCEL switch in CANCEL position.

- C. CP indication must disappear.

(39) On AFCS control unit, engage AP2 switch.

(40) On circuit breaker panel 13-216, trip then reset circuit breaker 2F130, map ref. D15.

(a) AP2 and FD2 switches disengage.

(b) On ITEM control and indicator panel, C. CP indication must appear in window 6.

(b1) Place side 2 READ-CANCEL switch in CANCEL

position.

- C. CP indication must disappear.

(41) On centre console, operate AFCS datum adjust unit TURN knob in either sense.

(a) AP1, then AP2 switches, cannot engage.

(b) On ITEM control and indicator panel, no indication must appear in windows.

(42) Place TURN knob in neutral position, then engage AP1, FD1, and FD2 switches on AFCS control unit.

(43) On centre console, operate pitch trim handwheel so that ELECTRIC TRIM switches 1 and 2 return to OFF position, then place handwheel in 0 degree position.

(a) AP1 switch disengages.

(b) On ITEM control and indicator panel, ET indication must appear in windows 1 and 5.

(b1) Place both READ-CANCEL switches in CANCEL position.

- ET indication must disappear.

(44) Engage ELECTRIC TRIM control unit switches 1 and 2, then AP1 switch on AFCS control unit.

(45) On throttle control lever No.1, press then release instinctive disconnect push-button.

(a) AT1 and AT2 switches disengage.

(b) On ITEM control and indicator panel, no indication appears in windows.

(46) On AFCS control unit, engage AT1 and AT2 switches, then repeat operation, using throttle control lever No.4 instinctive disconnect push-button in lieu of throttle control lever No.1 push-button. The results must be identical (no indication).

(47) On AFCS control unit, engage AT1 and AT2 switches, then, on AP/FD section, select IAS HOLD mode.

(a) AT1 and AT2 switches disengage.

(b) On ITEM control and indicator panel, no indication appears in windows.

(48) On AFCS control unit, disengage then re-engage AP1 switch as well as AT1 and AT2 switches.

(49) Quickly move the four throttle control levers.

(a) AT1 and AT2 switches disengage.

(b) On ITEM control and indicator panel, AT indication must appear in windows 1 and 5.

(b1) Place both READ-CANCEL switches in CANCEL position.

- AT indication must disappear.

(50) Place the four throttle control levers in mid-way position, then engage AT1 and AT2 switches on AFCS control unit.

(51) On circuit breaker panel 13-215, trip then reset circuit breaker 1C653, map ref. F6.

(a) AUTOSTAB No.1 control unit PITCH lever, and AP1 and FD1 switches return to OFF position.

(b) On ITEM control and indicator panel, SFC indication appears in window 1.

(b1) Place side 1 READ-CANCEL switch in CANCEL position.

- SFC indication must disappear.

(52) On AFCS control unit, engage AP2 switch.

(53) On circuit breaker panel 13-216, trip then reset circuit breaker 2C653, map ref. C16.

(a) AUTOSTAB No.2 PITCH lever returns to OFF position as well as AP2 and FD2 switches.

(b) On ITEM control and indicator panel SFC indication appears in window 5.

(b1) Place side 2 READ-CANCEL switch in CANCEL position.

- SFC indication must disappear.

(54) On AUTOSTAB No.1 and AUTOSTAB No.2 control units, engage PITCH levers.

(55) On shelves 8-215 and 8-216, on front face of both autostabilization computers (1C31, 2C31), remove protective caps from ZA test sockets.

(a) On computer No.1 (1C31) ZA test socket.

(a1) Apply a voltage ranging between 0 and 2.4 VDC between terminals 43 and 39 (ground).

- AUTOSTAB No.1 control unit PITCH lever returns to OFF position.

(a2) Apply a voltage ranging between 0 and 2.4 VDC between terminals 44 and 39 (ground).

- AUTOSTAB No.1 control unit ROLL lever returns to OFF position.

(a3) Apply a voltage ranging between 0 and 2.4 VDC, between terminals 11 and 39 (ground).

- AUTOSTAB No.1 control unit YAW lever returns to OFF position.

(b) On ITEM control and indicator panel, place side 1 READ-CANCEL switch in READ position.

- AS. P, AS. R, and AS. Y indications must appear cyclically in window 1.

(b1) Place side 1 READ-CANCEL switch in CANCEL position.

- AS. P, AS. R, and AS. Y indications must disappear.

(56) Repeat the operations described from 3.D (55) (a) (a1) through 3.D (55) (b) (b1) on terminals of Autostabilization computer No.2 (2C31). The results must be identical, with displays in window 5 (side 2).

(57) Place protective caps on ZA test sockets then secure access panels 215AS and 216AS.

(58) Engage AUTOSTAB No.1 and AUTOSTAB No.2 control units PITCH, ROLL, and YAW levers.

(59) On AFCS control unit, engage AP1, FD1, and FD2 switches

(60) On circuit breaker panel 2-213, trip then reset circuit breaker 1C191, map ref. F4.

(a) AT1, AP1, and FD1 switches disengage.

(b) On ITEM control and indicator panel, WLD indication must appear in window 2.

(b1) Place side 1 READ-CANCEL switch in CANCEL position.

- WLD indication must disappear.

(61) On AFCS control unit, engage AP2 switch.

(62) On circuit breaker panel 13-216, trip then reset circuit breaker 2C191.

(a) AT2, AP2, and FD2 disengage.

(b) On ITEM control and indicator panel, WLD indication must appear in window 6.

(b1) Place side 2 READ-CANCEL switch in CANCEL position.

- WLD indication must disappear.

(63) On AFCS control unit, engage AT1, AT2, FD1, and FD2 switches.

(64) Both RAD-INS switches being in RAD position, display an ILS frequency (for instance : 108.3 Mhz) on VOR/ILS/DME control units.

(65) On radio altimeter ground test unit, simulate an altitude of 400 ft.

(66) On AFCS control unit, select LAND mode, then proceed to glide beam capture.

(67) On AFCS control unit, engage AP1 and AP2 switches.

(68) Place Captain's RAD-INS switch in INS position.

(a) AP1 and FD1 switches disengage.

(b) On ITEM control and indicator panel, ILS indication must appear in window 2.

(69) Place First Officer's RAD-INS switch in INS position.

(a) AP2 and FD2 switches disengage.

(b) On ITEM control and indicator panel, ILS indication must appear in window 6.

(b1) Place side 2 READ-CANCEL switch in CANCEL position.

- ILS indication must disappear.

(70) Place both RAD-INS switches in RAD position.

(71) On AFCS control unit, engage AP1, FD1, and FD2 switches, then select LAND mode.

(72) Engage AP2 switch, then proceed to glide beam capture.

**ON A/C 001-001,

(73) On circuit breaker panel 2-213, trip then reset circuit breaker 1S56, map ref. D7.

R **ON A/C 002-007,

(73) On circuit breaker panel 2-213, trip then reset circuit breaker 1S56, map ref. D8.

(a) AP1 and FD1 switches disengage.

(b) On ITEM control and indicator panel, R-ALT indication must appear in window 2.

(b1) Place side 1 READ-CANCEL switch in CANCEL position.

- R-ALT indication must disappear.

(74) On circuit breaker panel 13-216, trip then reset circuit breaker 2S56, map ref. F19.

(a) AP2 and FD2 switches disengage.

(b) On ITEM control and indicator panel, R-ALT indication must appear in window 6.

(b1) Place side 2 READ-CANCEL switch in CANCEL position.

- R-ALT indication must disappear.

(75) On AFCS control unit engage FD1 and FD2 switches, then

select LAND mode.

(76) On AFCS control unit, engage AP1 and AP2 switches.

(77) On Captain's control column handwheel, press, then release AP DISC instinctive disconnect switch.

(a) AP1 and AP2 switches disengage.

(b) On ITEM control and indicator panel, no disengagement indication nust appear.

(78) On AFCS control unit, engage AP1 and AP2 switches.

(79) Push Captain's control column rearwards until both AP channels disconnect.

(a) AP1 and AP2 disengage.

(b) On ITEM control and indicator panel, AP. P indication must appear in windows 1 and 5.

(80) On AFCS control unit, disengage FD1 and FD2 switches, then engage AP1 switch.

**ON A/C 001-001,

(81) On circuit breaker panel 13-215, trip then reset circuit breaker 1C20, map ref. F5.

R **ON A/C 002-007,

(81) On circuit breaker panel 2-213, trip then reset circuit breaker 1C20, map ref. C5.

(a) AP1 switch disengages

(b) On ITEM control and indicator panel, AP. A indication must appear in window 1.

(82) On AFCS control unit, engage AP2 switch.

(83) On circuit breaker panel 13-216, trip then reset circuit breaker 2C20, map ref. A17.

(a) AP2 switch disengages.

(b) On ITEM control and indicator panel, AP. A indication must appear in window 5.

(84) On ITEM control and indicator panel.

(a) Place side 1 READ-CANCEL switch in READ position.

(a1) AP. P and AP. A indications must appear cyclically in window 1.

(b) Place side 2 READ-CANCEL switch in READ position.

(b1) AP. P and AP. A indications must appear periodically in window 5.

(c) Place both READ-CANCEL switches in CANCEL position

(c1) AP. P and AP. A indications must disappear.

(85) On AFCS control unit, engage FD1 switch.

(86) On circuit breaker panel 1-213, trip then reset circuit breaker 1C17, map ref. Q13.

(a) FD1 switch disengages.

(b) On ITEM control and indicator panel, FD. P indication must appear in window 1.

(b1) Place side 1 READ-CANCEL switch in CANCEL position.

- FD. P indication must disappear.

(87) On AFCS control unit, engage FD2 switch.

(88) On circuit breaker panel 5-213, trip then reset circuit breaker 2C17, map ref. A11.

(a) FD2 switch disengages.

(b) On ITEM control and indicator panel, FD. P indication must appear in window 5.

(b1) Place side READ-CANCEL switch in CANCEL position.

- FD. P indication must disappear.

(89) On AFCS control unit, engage AP1 and FD1 switches, then select TURB mode.

(a) FD1 switch disengages.

(b) On ITEM control and indicator panel, no indication appears.

(90) On AFCS control unit, engage AP1 switch.

(91) Engage AP2 and FD2 switches, then select TURB mode.

(a) FD2 switch disengages.

(b) On ITEM control and indicator panel, no indication appears.

(92) On circuit breaker panels 2-213 and 13-216, trip then reset respectively circuit breaker 1C37, map ref. C6, then circuit breaker 2C37, map ref. D17.

(a) AUTOSTAB No.1 and AUTOSTAB No.2 control units PITCH, ROLL and YAW levers return to OFF position.

(b)1AP2 switch disengages.

(c) On ITEM control and indicator panel, PWR indication must appear in windows 2 and 6.

(c1) Place both READ-CANCEL switches in CANCEL position.

- PWR indication must disappear.

(93) On ITEM control and indicator panel, place both IFM-OFF-TEST switches in OFF position.

(94) Reset the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
NOSE UC WEIGHT SW 'A' SYS SUP	1-213	G 291	M16
NOSE U/C W/SW 'B' SUP	2-213	G 296	D 8

(a) On ITEM control and indicator panel, windows 2 - 4 - 6 and 8 are not illuminated in red.

(95) Disengage ELECTRIC TRIM control unit switches 1 and 2.

(96) On AFCS control unit, disengage AT1 and AT2 swithces.

(97) On master warning panel and on Warning and Landing Display indicators, cancel the various warnings resulting from disengagements.

E. Close-Up

(1) On flight control unit (Ref. 27-00-00, Servicing).

(a) Place the three flight control switches in MECH mode.

(b) Place BLUE INVERTER and GREEN INVERTER switches in PWR OFF position.

(c) Place both ANTI STALL SYSTEM switches in OFF position.

(2) On centre console

(a) Place throttle control levers in full idle position.

(b) Place ADC1 and ADC2 switches in OFF position.

(3) De-energize Blue hydraulic system (Ref. 29-12-00, Servicing) and Green hydraulic system (Ref. 29-11-00, Servicing).

(4) Place MSU switches on OFF position to de-energize the three Inertial Navigation Systems (Ref. 34-45-00, Adjustment/Test).

R **ON A/C 002-007,

(5) Reset the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
FLT CONT & NAV BUS 14 X S	2-213	X 355	H 2
NAV INS BUS 13 X S	13-216	X 345	G 4

**ON A/C 001-001,

(5) Not applicable

(6) De-energeze and disconnect radio altimeter ground test unit (Ref. 34-42-00, Adjustment/Test)

(7) Close and lock lower baggage compartment access door (Ref. 52-31-21, Adjustment/Test).

(8) De-energize the aircraft electrical network and disconnect electrical ground power unit, (Ref. 25-41-00, Servicing).

(9) Remove access platforms.

ITEM COMPUTER - MAINTENANCE PRACTICES

In the event of the ITEM Computer not being obtainable, an ITEM Shorting Connector 4BA22463 may be used.
This will provide the facility for normal AFCS operation of aircraft.

ITEM COMPUTER - REMOVAL/INSTALLATION

1. General

WARNING : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

ITEM computers 1C381 and 2C381 are respectively mounted on shelves 4-215 and 4-216 in electronics racks. Locating pins are provided on connectors so that computer replacement with a computer of a different type is made impossible.

Removal procedures for replacement of the two computers being identical ; only one procedure is described.
Only the circuit breakers associated with the computer to be removed are to be tripped.

NOTE : The aircraft may be flown after replacement of a faulty ITEM computer by a shorting connector. This connector is mounted in an ARINC case (1/2 ATR short case) equipped with two handles. This equipment is referenced as : DUMMY ITEM COMPUTER D921676000. The installation procedure for this equipment is identical with that for an ITEM computer.

R 2. ITEM Computer or Dummy ITEM computer D921676000

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.47 m (14 ft.8 in.)	
Circuit Breaker Safety Clips	

B. Prepare

(1) For removal of computer No.1 (1C381), trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AFCS TEST 1 28V SUP	1-213	1C 383	R12
AFCS MODE SYS 1 LTS SUP	13-215	1C 273	B 5

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AFCS TEST 1 115V SUP		1C 384	D 6

(2) For removal of computer No.2 (2C381), trip, safety and tag the following circuit breakers :

SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AFCS TEST 2 28V SUP	5-213	2C 383	F11
AFCS MODE SYS 2 LTS SUP	13-216	2C 273	E17
AFCS TEST 2 115V SUP		2C 384	F17

R (3) Remove panel 215BS to gain access to shelf 4-215 for
R removal of computer No.1 (1C381) or panel 216BS for
R removal of computer No.2 (2C381).

C. Remove

(1) On the front face of the computer, press unlatching
R buttons (1) on top of the two pulling handles.

R (a) The two movable levers (2) fall.

(2) Fully lower the two levers

R (3) Withdraw computer by pulling on handles

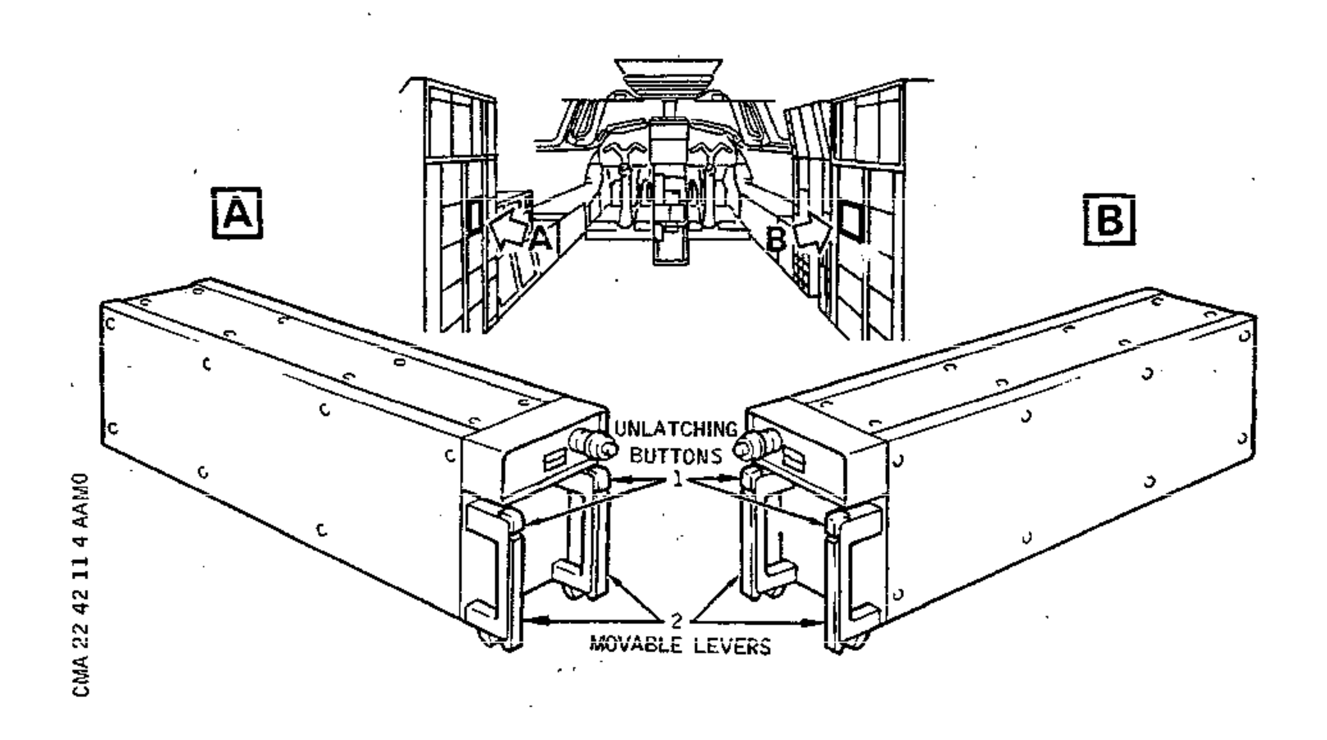
D. Preparation of Replacement Component

(1) Make certain that computer housing is clean and that
R shelf connectors are in correct condition (no corro-
R sion).

R (2) Visually check ITEM computer or dummy ITEM computer
R D921676000 for correct external condition (no dents)
R and check that connectors are undamaged and bear no
trace of corrosion.

R E. Installation of Computer or Dummy ITEM computer D921676000

(1) Press the two unlatching buttons (1).



Location of ITEM Computers
Figure 401

R (a) The two movable levers (2) fall.

R (2) Position computer or dummy ITEM computer D921676000 on its rails.

R (3) Push computer or dummy ITEM computer D921676000 fully home.

R
R (4) Lift the two movable levers until pawls lock into position.

(5) Remove safety clips and tags and reset circuit breakers tripped previously only after installation of computer.

R NOTE : After installation of dummy ITEM computer D921676000 the circuit breakers remain tripped until installation of computer.

F. Test

Test computer (Ref. 22-42-00, Adjustment/Test, Operational

Test, paragraphs 2.C and 2.D)

G. Close-Up

R (1) Install panel 215BS or 216BS.

R (2) Remove access platform.

ITEM CONTROL UNIT - REMOVAL/INSTALLATION

1. General

WARNING : OBSERVE THE GENERAL SAFETY PRECAUTIONS DESCRIBED IN 22-00-00, SERVICING.

The ITEM control unit (C382) is mounted at Flight Engineer's station, on RH lower panel, in zone 8-214.

2. ITEM Control Unit

A. Equipment and Materials

DESCRIPTION	PART NO.
Access Platform 4.47 (14 ft.8 in.)	
Circuit Breaker Safety Clips	
Electrical Connector Blanking Caps	

B. Prepare

(1) Trip, safety and tag the following circuit breakers :

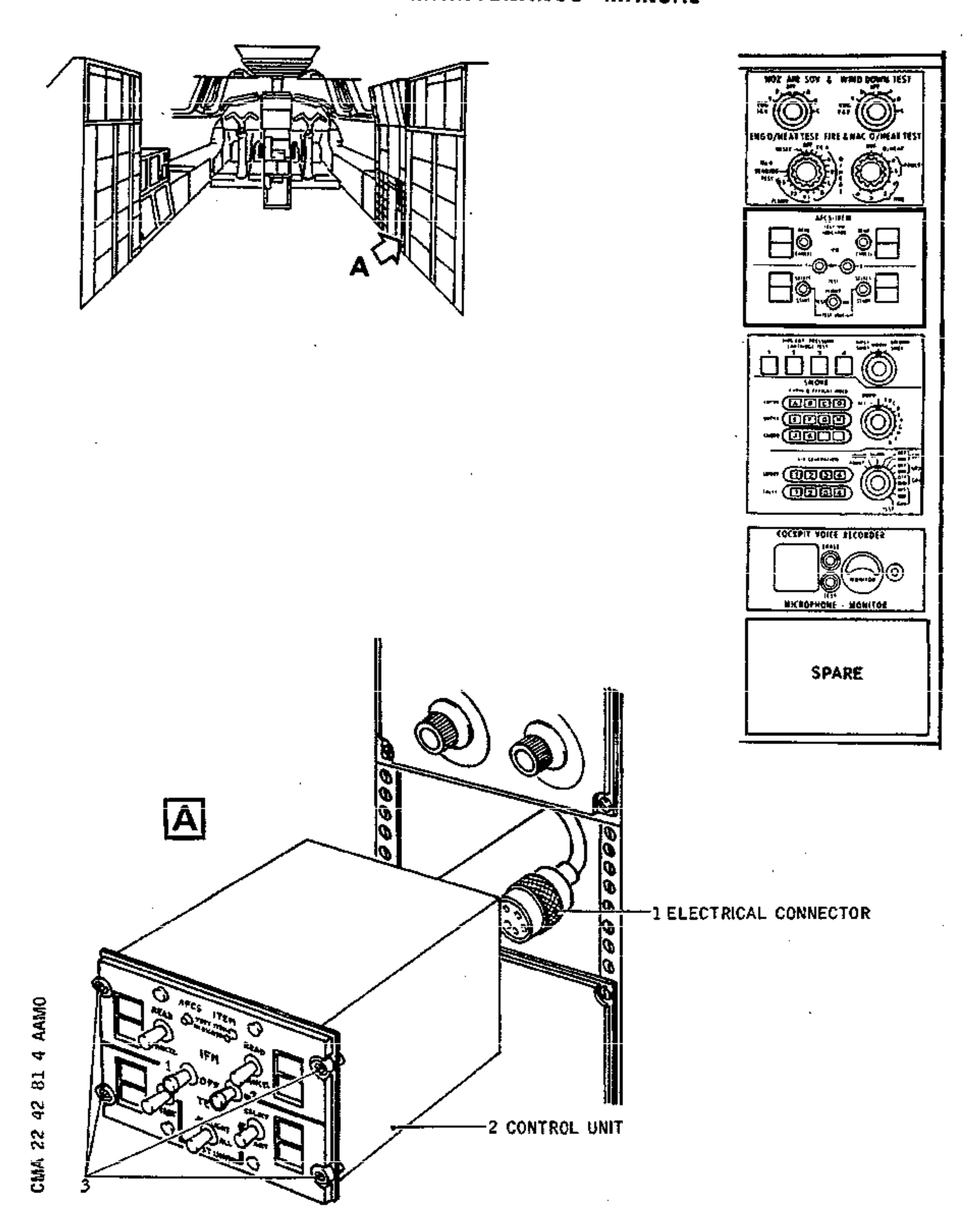
SERVICE	PANEL	CIRCUIT BREAKER	MAP REF.
AFCS TEST 1 28V SUP	1-213	1C 383	R12
AFCS TEST 2 28V SUP	5-213	2C 383	F11
AFCS TEST 1 115V SUP	13-215	1C 384	D 6
AFCS TEST 2 115V SUP	13-216	2C 384	F17
3CM STN RH INST LTS SUP	14-215	L 376	F11

C. Remove

(1) Untighten the four quarter-turn fasteners (3).

(2) Withdrawn control unit (2) from its recess.

(3) Disconnect connector (1) from rear face socket.



Installation of ITEM Control Unit
Figure 401

(4) Remove control unit (2).

D. Preparation of Replacement Component

(1) Visually check control unit for evidence of corrosion, nicks, and dents.

E. Install

(1) Connect connector (1) to rear face socket.

(2) Push control unit (2) fully home.

(3) Tighten the four quarter-turn fasteners (3).

(4) Remove circuit breaker safety clips and reset the circuit breakers previously tripped.

F. Test

(1) Ref. 22-42-00, Adjustment/Test - Operational Test, paragraphs 2C and 2D.

G. Close-Up

(1) Remove access platform.

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END OF THIS SECTION

NEXT